Our National Transportation System Bibbins

OUR NATIONAL TRANSPORTATION SYSTEM

PERSPECTIVE OF STATUS AND NEEDS.
COORDINATION—THE REAL MEANING.
METROPOLITAN TRANSPORT PLAN—
THE NEED.

By J. ROWLAND BIBBINS
Engineer

ADDRESS, MARCH 16th, 1923
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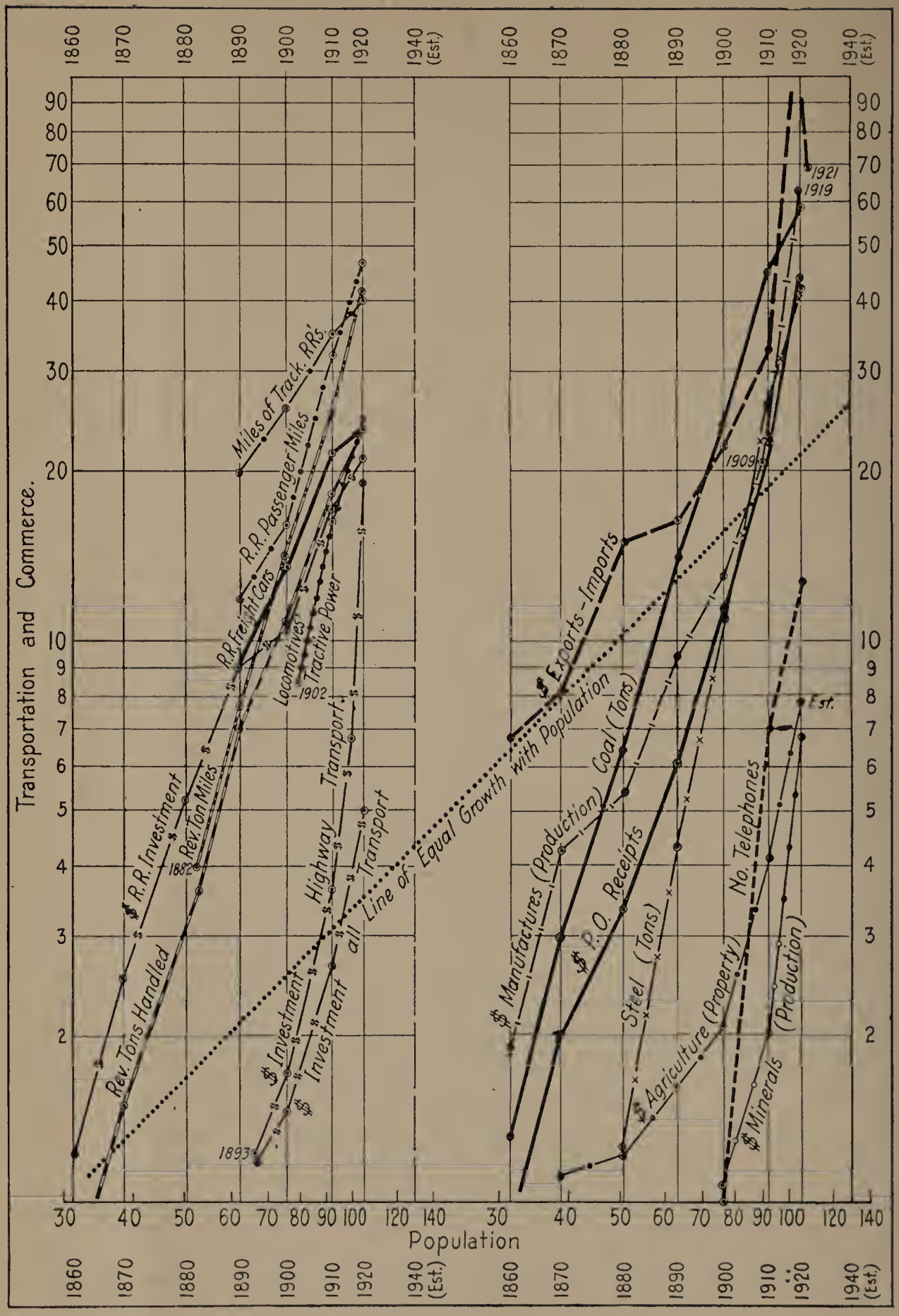


FIG. 1

Log Diagram (Transportation and Commerce)

The PRESIDENT—Now, we will proceed immediately to the business of the evening, because we have quite a long and interesting program. It gives me pleasure to announce to you that the subject which we will discuss tonight, "Our National Transportation System," is to be presented by a gentleman who for the past two years has been manager of the Transportation Department of the U. S. Chamber of Commerce, in which position he has given special attention to the study of the coordination of all transportation agencies—railway, traction, highway, waterway, airway, and marine. He was particularly well fitted for this position because in his association as supervising engineer with the B. J. Arnold Engineering Organization of Chicago, he studied intensively the transportation problems of some 20 cities of the United States and Canada. It gives me pleasure to introduce Mr. J. Rowland Bibbins.

OUR NATIONAL TRANSPORTATION SYSTEM

A Perspective of the Status and Needs of the Country's Second Industry, and the Hopeful Possibilities of More Complete Operating Unification—the Real Meaning of Co-ordination

By J. Rowland Bibbins, Engineer, Washington, D. C.

(Numerous lantern slide illustrations during the presentation of Mr. Bibbins' paper are covered by cuts in its publication.)

(For discussion of paper, see Club proceedings—pages 7019 to 7036.)

Over the portal of the Transportation Building, Chicago Exposition, were inscribed these meaningful words:

"Easy Transportation for Men and Things from Place to Place, Makes a Nation Strong and Great."

We have now come to look upon transportation in a still more fundamental way, i. e., the complete journey from origin to destination—producer to consumer. This does not mean simply the rail, water or air journey, but also involves the important operations of collection and distribution, including terminal clearing, transshipment, and warehousing. These *extra*-carrier operations have assumed an importance in the study of over-all transport cost not generally realized until now the combination of traffic growth and cost levels, intensified by the war, have brought these phases to the front. The subject will, therefore, be discussed from this broad viewpoint—producer to ultimate consumer.

Acknowledgments: To members of the U. S. Chamber of Commerce Committees and others who have assisted the writer in suggestions on the transport valuations herein, and to Mr. O. B. Bestor, Assistant Engineer, formerly on U. S. railroad valuation work, who assisted in the detailed assembly. For illustrations: (a) Chicago Traction and Subway Commission; (b) Arnold Reports; (c) Board Supervising Engineers, Chicago Traction; (d) American Railway Association, Car Service Division; (e) American Association Street Highway Officials; (f) Transportation Department, U. S. Chamber of Commerce (by the Author); (g) H. H. Goetz, deceased; (h) Riv. and Harb. Cong.; (i) National Aero. Association, William B. Stout.

Furthermore, various complex relationships in transport operations are demanding consideration and study with a view to securing a better public understanding. Primarily we have always had contacts in the transportation business between management, men, bankers, wholesalers and retailers, regulating bodies, and the Government. Now, we have in more intensive form not only the inter-relation between the different forms of carriers themselves and the great regional industries, but also the public welfare of the great centers of population or gateways, crystalized in what is known as the City or District Plan. This is an admission that transportation exercises a vital control over the economic and social destinies of between 50 and 60 millions of our city people—a more powerful control than even the Government itself.

The United States is the long haul country of the world's developed regions. Our national and commercial life depends upon transportation. Compare the granger regions of Europe, Russia, North Africa, Argentine, Australia, with that of our middle west. While we have the most efficient and cheapest transportation of the world, the average length of grain haul from our mid-country is probably five or more times that of the other countries. And in economic effect any differential raise in rail rates comparable to other countries, shoves our great interior that much further inland from seaboard competition.

This great national transport system, with rail mileage long enough to reach to the moon and part way back, with waterways surpassing in potential capacity those of Europe, and with a tributary road mileage sufficient to span the country from coast to coast 800 times, has developed a definite distribution of population, industry, production, and wealth, upon a social and economic table-land built up through long years of continuous effort and adjustment. In this the freight structure and carrier capacity, both rail and water, have played commanding parts. However, this economic structure is changing, due not only to the social proclivities of our people, but also to new industrial methods, shift in regional production, rise of new communities, and new methods of transport.

The Drift of Peoples

The continual drift to the cities occasions much concern with widely differing viewpoints. In 1890, 36 per cent. of our people lived in cities of over 2,500 population; 1900, 46 per cent.; 1920, 51 per cent., indicating a tendency toward intensive industrialism, a tendency perhaps enhanced by favoring influences in the rate structure. By the same token, fear is expressed by some of a waning supply of food production. But this is denied with equal positiveness on the strength of increasing potentiality of the land through better methods of cultivation. And the social function of the automobile is appearing with greater definiteness in widening the farmer's social and economic horizon to double or treble his former radius. Thus new methods and agencies constantly change the environs and commerce of our people in a most perplexing fashion, making it difficult to predict even the not distant future with reasonable accuracy. Professor Raymond Pearl, of Johns Hopkins, reached the deduction from experimental data that not more than 400 million people can be sustained in the United States; then the explorer, Stefanson, comes along and predicts that the Canadian Northlands will become the granary of the world, and Canada the strongest commercial competitor of the U. S. The best that can be done, therefore, is to appraise our transportation resources in the light of constant improvement in method and efficiency.

FIG. 2
U. S. on Europe (Map)

DIFFUSION OR CONCENTRATION?

Much thought is being given to the problem of diffusion of industry throughout the country, rather than increasing concentration in over-populated centers—a process quite at variance with the policy of past decades in encouraging just such concentration which was thought to be in the interest of more direct and cheaper transportation and distribution. But this is automatically changing through the pressure of congestion, not only within the cities, but in regional production and highway development. Here it is evident that rate control will play a most important part in the future, as it has in the past, and some of us are optimistic enough to believe that these great regional adjustments of population and commerce can be brought about gradually enough to avoid shock always occasioned by remedies as sudden and arbitrary as were forced by the war. It does seem reasonably clear that any long-continued high rate-differential against the interior in products concerned in foreign commerce and competition will have the ultimate effect of forcing industry to seaboard. All this emphasizes the need of the broadest study of the problem.

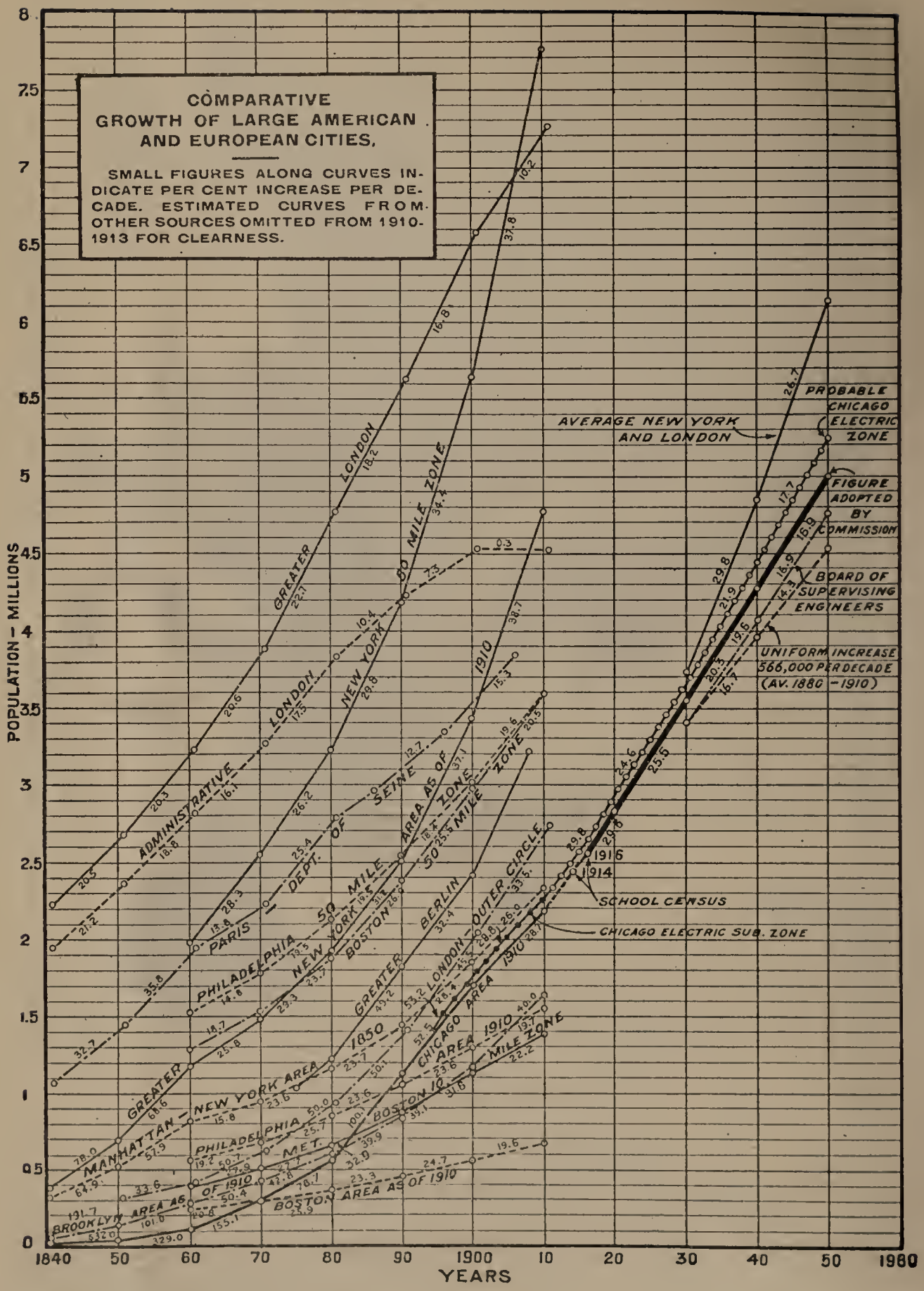


FIG. 3

Population Curves of Cities

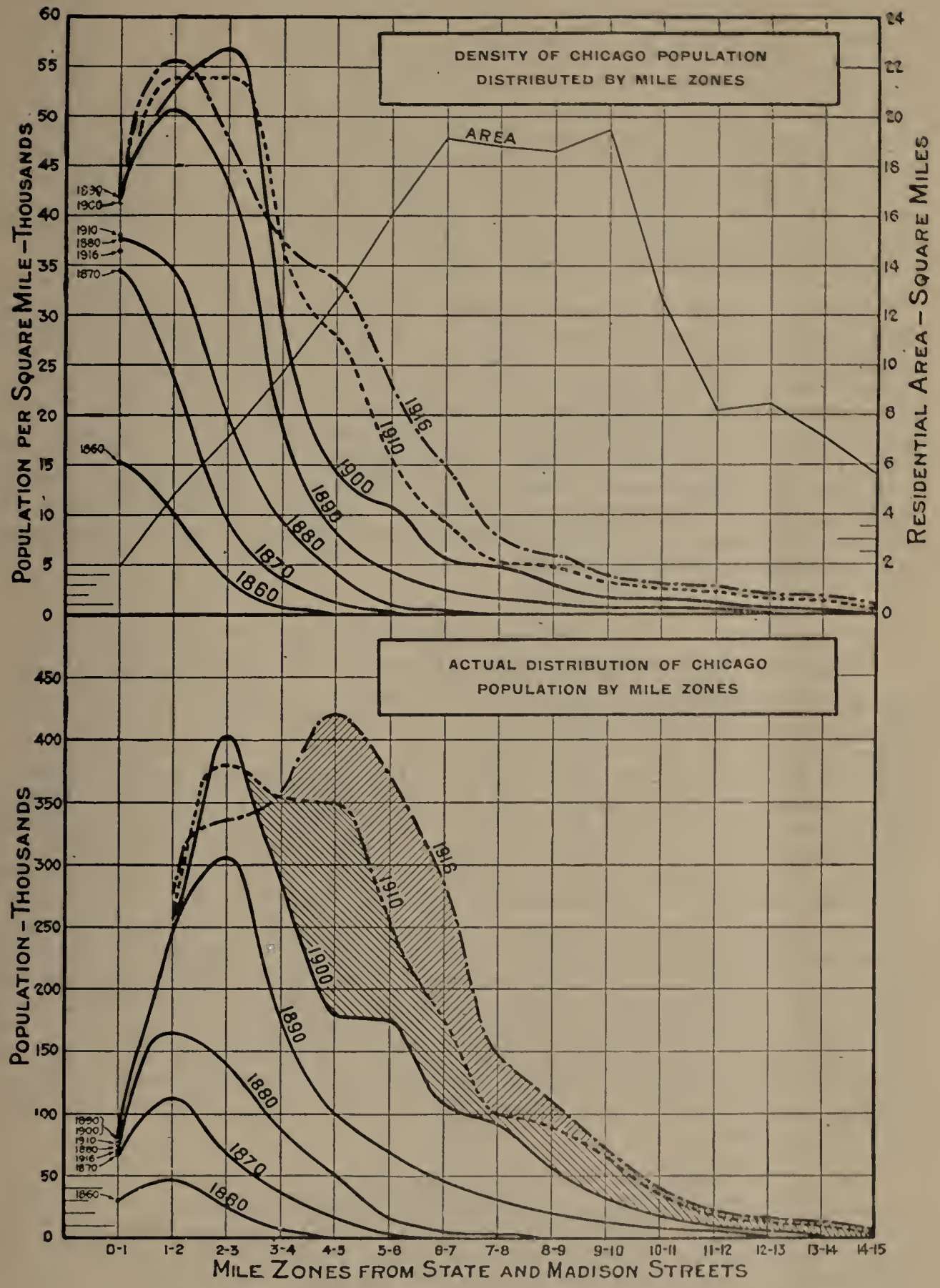


FIG. 4

Population Density Curves by Mile Zones

THE COMPLETE TRANSPORT MACHINE

What does it mean to lift 2.5 billion tons per annum and transport each ton over 180 miles average haul, also 1.25 billion passengers, an average of 40 miles? One naturally thinks first of the 400 thousand miles of railroad and terminal track, 2.5 million cars, and the 66 thousand locomotives to haul this vast traffic. But there are also 18 million gross tons of American shipping, big and little, lake, coastwise and ocean (not counting the surprising total of boats and barges on our waterways.) And in addition, foreign shipping seems to hold on to the bigger half of our commerce abroad. For this water service, over six million lineal feet of wharfage and developed water front exists. For the daily handling of our city people, 45 thousand miles of electric and interurban railway track is in operation.

Now we come to the public roads of which 186 thousand miles, or about seven per cent. of the total of 2.5 million miles are designated as public aid highways. It is idle to attempt an estimate of the total future mileage of so-called motor-highways, but at least it would not seem unreasonable to assume a mileage equal to that of the line mileage of railroads, viz., somewhat over 10 per cent. of the country's road system. And what is the "rolling stock" for this vast mileage? Is it the 1.5 million motor trucks that should alone concern us, or the 12 million passenger vehicles as well? In recent times the distinction between pleasure and business in motor cars seems almost as puzzling as in railroad passenger traffic.

The Motor a Distributor

There is much discussion nowadays over the motor car as a competing or supplemental agency to railroads. Whether or not recent estimates are true that motors are now handling from two-thirds to three-quarters of the rail tonnage, this reflection is pertinent, viz., that outside of ore, coal, etc., and such commodities as move car-load direct, origin to final consumer, practically all of the domestic railroad tonnage must move over highways and the city streets once or more times, according to the number of fabrications involved in manufacture or sale. It probably takes over 100 million one-ton truck loads to haul our *surplus* farm production to city destinations. Except for electric railway and horse-drawn vehicles, there are no other delivery agencies, than motors. Even the water courses are negligible in this movement, although they are becoming more and more important in main carrier movement. This cannot be competition in the broad sense, for collection and distribution is as important an operation to the consumer as the main carrier. We must now think in terms of over-all cost, including all the man-handling, packing and crating, storing, etc., involved, not simply the line haul costs between railroad station platforms.

It is, however, an undoubted fact that the motors have been reaching after some long haul business, that is, 100 miles or over, perhaps because of insufficient knowledge of the cost of service in the long run. At the same time, the wiser heads of the industry are visualizing more than ever before the problem of economic balance between rail and motor carriage (including collection and delivery) and before long the economic length of haul will not be an unknown quantity. Much progress has already been made on the Connecticut road census where economic hauls of 50, 75, and even 100 miles were found possible for the truck, depending upon the commodity.

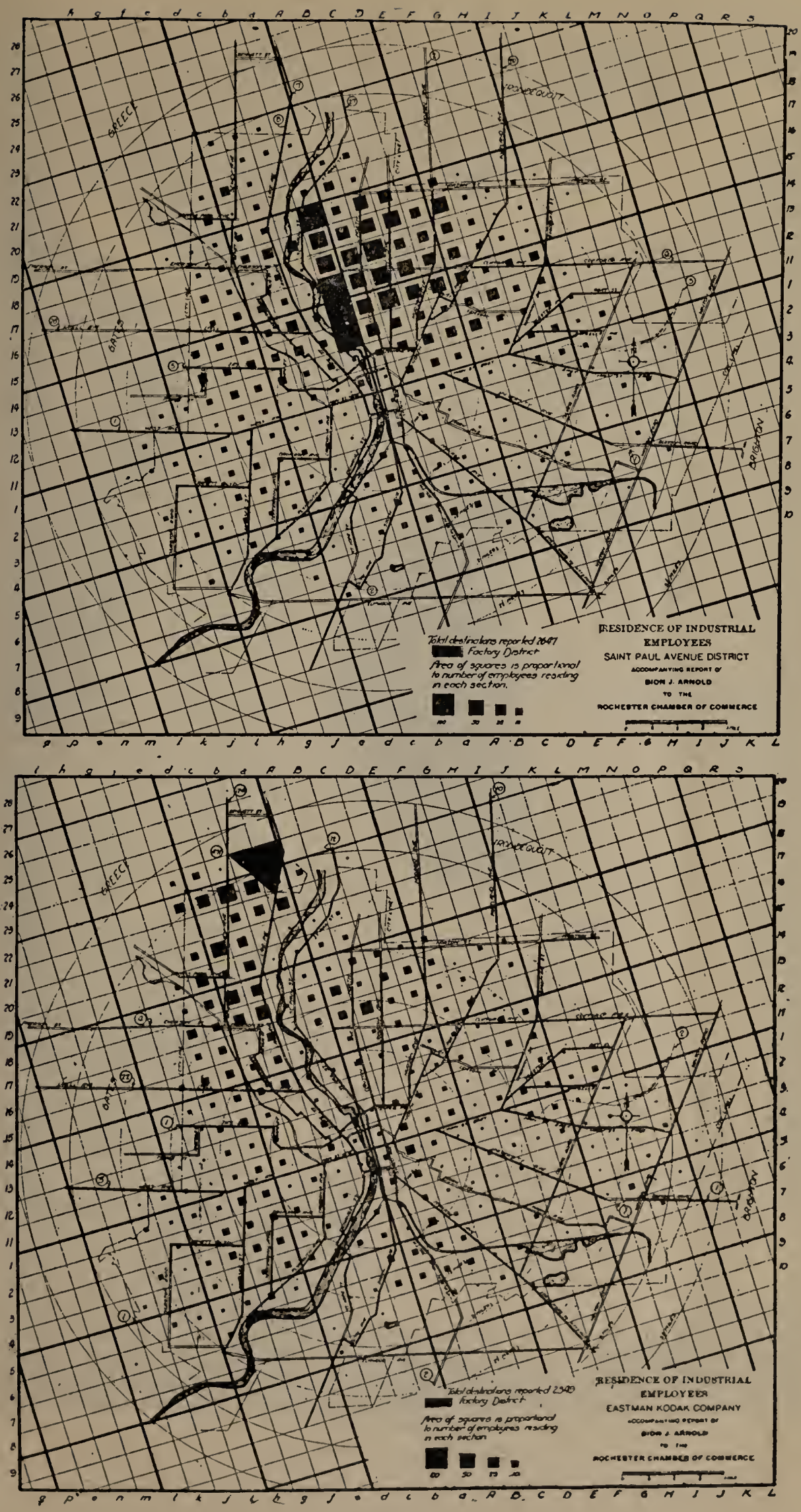


FIG. 5
Industrial Survey (Rochester)

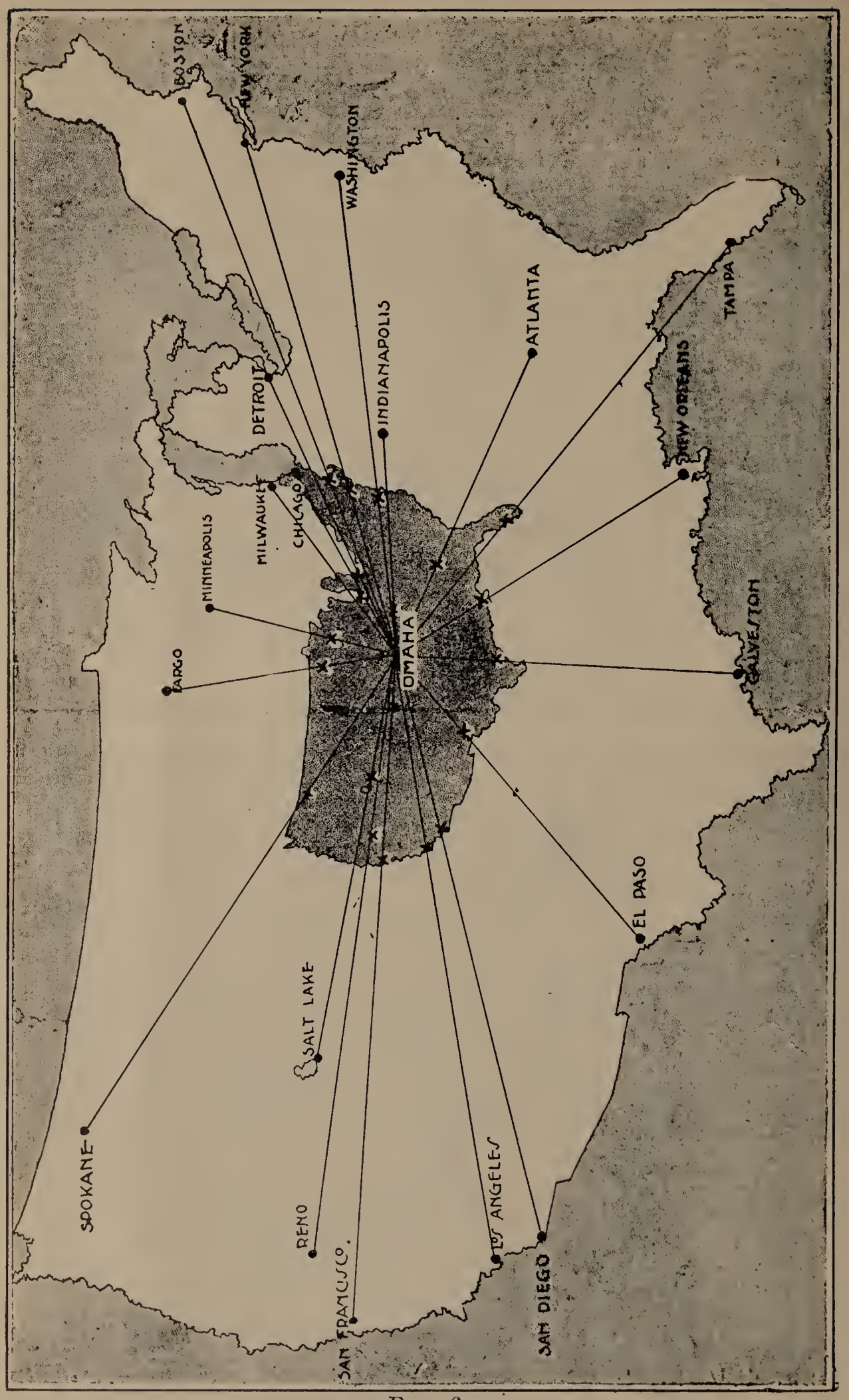


FIG. 6
Air Map vs. Steam

FIG. 7

Highway Map—7% Roads

The electric railways are also interesting themselves in handling expedited freight (where they are not estopped by franchise limitations), because of their unique delivery facilities, intra-city. But this is all relatively short haul.

Waterways Already Important

Mississippi Barge Line with its powerful 10,000 ton tow units is handling a growing tonnage of merchandise freight, largely long haul, and the Pittsburgh steel industry is also organizing for handling considerable of its tonnage by barge. Such of the lake package lines as remain from the "divorce proceedings" of a few years ago also handle some considerable short and long haul traffic. But the lake carrier system still stands largely as an intermediate carrier of coal, ore, and grain. Even the antiquated St. Lawrence canals handle four or five million tons per year.

Coastwise service is growing rapidly, probably through the impetus of raised rail rates and traffic congestion; likewise coast-to-coast traffic since the opening of the Panama Canal. This whole coastal business has doubled within the year.

The fact remains, however, that the rail system is the great backbone long haul carrier of the country and should remain such in our transportation perspective. At this date it seems improper to conceive of the transport system otherwise than a great well-knitted rail net work *plus* certain supplemental long haul water carriers, all *served* by a vast collection and delivery system in local and rural centers by motor, trolley and horse (if such can long survive increasing mechanical development.)

That Package Business

And finally, there is to be reckoned with a little matter of 2.25 million tons of parcel post, and 7.6 million tons of express matter, both of which are largely high class expedited freight. In fact, the parcel post has become a tonnage business which has twice doubled within a period of seven years, with an increase in average weight per shipment from 1.9 pounds in 1916, to 4.1 pounds in 1921. (Express matter averages 85 pounds.) It is the biggest merchandise business in the world, and yet its facilities are totally different than those provided by the railroads for handling L. C. L. freight—a situation which cannot always continue. Parcel post has a peak load of over 30 per cent. above normal traffic, all during the Christmas season.

Quite recently attention has been drawn to this problem of parcel post-express-L. C. L. freight, and the possible future amalgamation of these services which are so closely related. It is a striking fact that while only four per cent. of the rail tonnage is L. C. L. freight, from 25 to 30 per cent. of the car supply is required for handling this service, which means nearly a quarter of a million cars. In the further study of this problem of future facilities for high, medium, and low class freight, it is clear that a better idea of the true cost of handling these classes should be had, including the relative use of the transport plant and the return on the investment, assuming that each class would be transported with speed and equipment suited to its special needs. Today the ox and the race horse are too often hitched together.

The Problem is Financing the Peak Load

A very important aspect of the operation of this vast dynamo is the seasonal load curve which has to be reckoned with just as in the case of a power plant or street railway with its definite peak load.

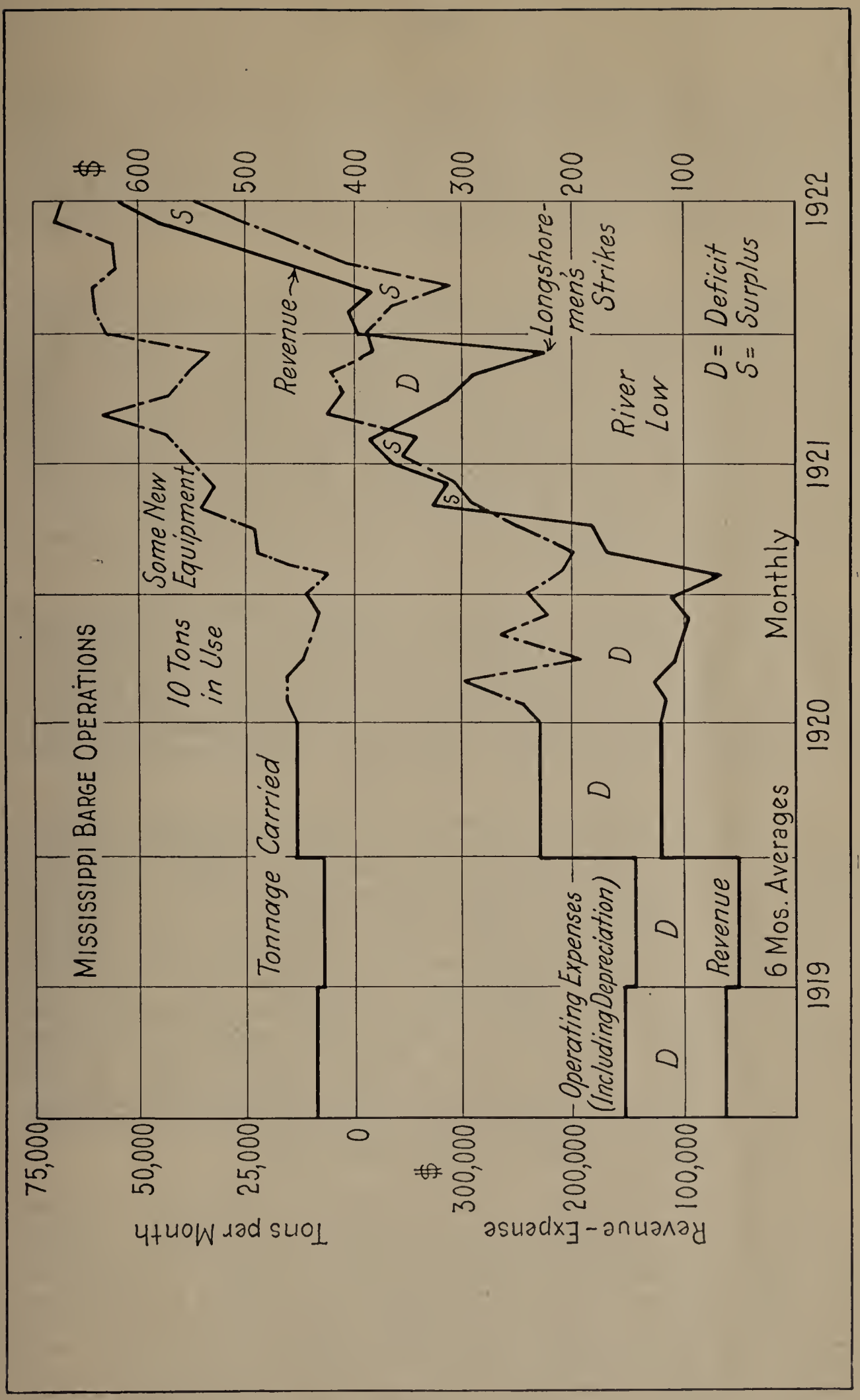


FIG. 8

Barge Line Operations

The year 1922-3 establishes a traffic high record in railroad history especially during the late fall weeks, and this was done in the face of great difficulties due to strikes, deferred maintenance. These conditions brought about also a new high record in car shortage, quite universal throughout the country. The wonder is that with a business boom in the budding, thc traffic was moved so well. But now the great qucstion is that of the future, next year, as well as 10 years hcnce.

Taking thc country as a whole, the railroad commodity loading gradually increases from spring to fall months by about 30 per cent., then the traffic drops abruptly to a mid-winter low point about 40 per cent. below the October peak. These seasonal cycles are quite definite from year to year, but the grain, coal, ore and live stock traffic show much more exaggerated peaks than the fairly constant merchandise traffic throughout the warm months, likewise the different regions. In fact, the ore peak is largely dictated by the open lake season, also grain peak to some extent. The northwestern district railroads have a normal fall peak 60 per cent. above spring, those of the eastern district about 40 pcr cent., the southern district practically no peak taken as a whole.

All this is mentioned to show that our transport plant must be designed and cquipped as nearly as practicable to meet peak loads. Otherwise the whole system must "slow down" at heavy traffic periods with a cumulative loss in efficiency and capacity. And in this process the whole commercial and industrial fabric of business must adjust itself, as it has done in the past years, to the peak load limitations of the machine—a process which involves great complexities of distribution and effect on market pricc relationships.

You will recognize this at once in the effect of seasonal car shortage, as well as in such emergencies as occurrcd in 1906-7, 1916-18, 1920, all of which were cxceeded by the shortage of 1922. It is even claimed by some that a shortage in transportation is the most effective stabilizer and check upon violent price movements, i. e., a full car supply would "bust the market." Between January and October, 1922, the railroad car service swung from a surplus of nearly 500,000 to a shortage of nearly 180,000 cars. This represents a total swing within 10 months of over 25 per cent. of the car equipment of the country, or perhaps 75 per cent. of the average number of cars loaded weekly throughout the ycar. Here we have another phase of peak load in the utility business. Just as street railway facilities are idle thrce-quarters of the time each day, between peaks, railroad facilities are also idle between seasonal peaks and business booms. But the percentage idleness of railroads is very much less.

The point to be made is that if adequate service is to be demanded as in power supply and city railways, the transport machine must be designed and financed on a peak load, rather than an average load basis. Otherwise we must have "strap hangers" in freight as well as in passenger service. This leads to the subject of investment and return, and it is in order to consider very frankly the capital demands for an all-rail system as contrasted with the capital for a combination system in which other and cheaper forms of carriers are brought into play to help carry the peak loads and otherwise supplement and relieve the main rail system. Here the waterways and the highways must receive sympathetic consideration.

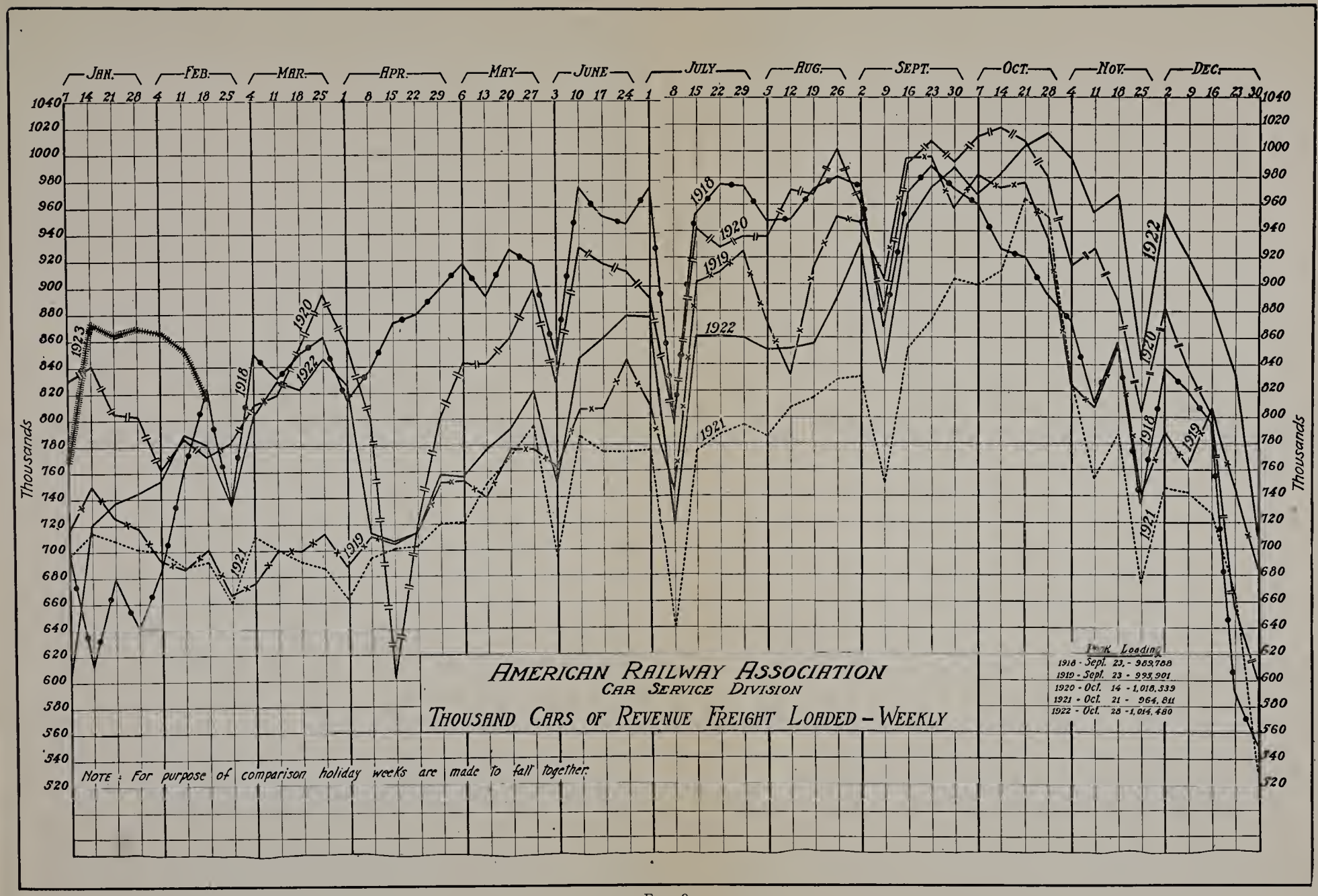


FIG. 9
R. R. Loadings Curves A. R. A.

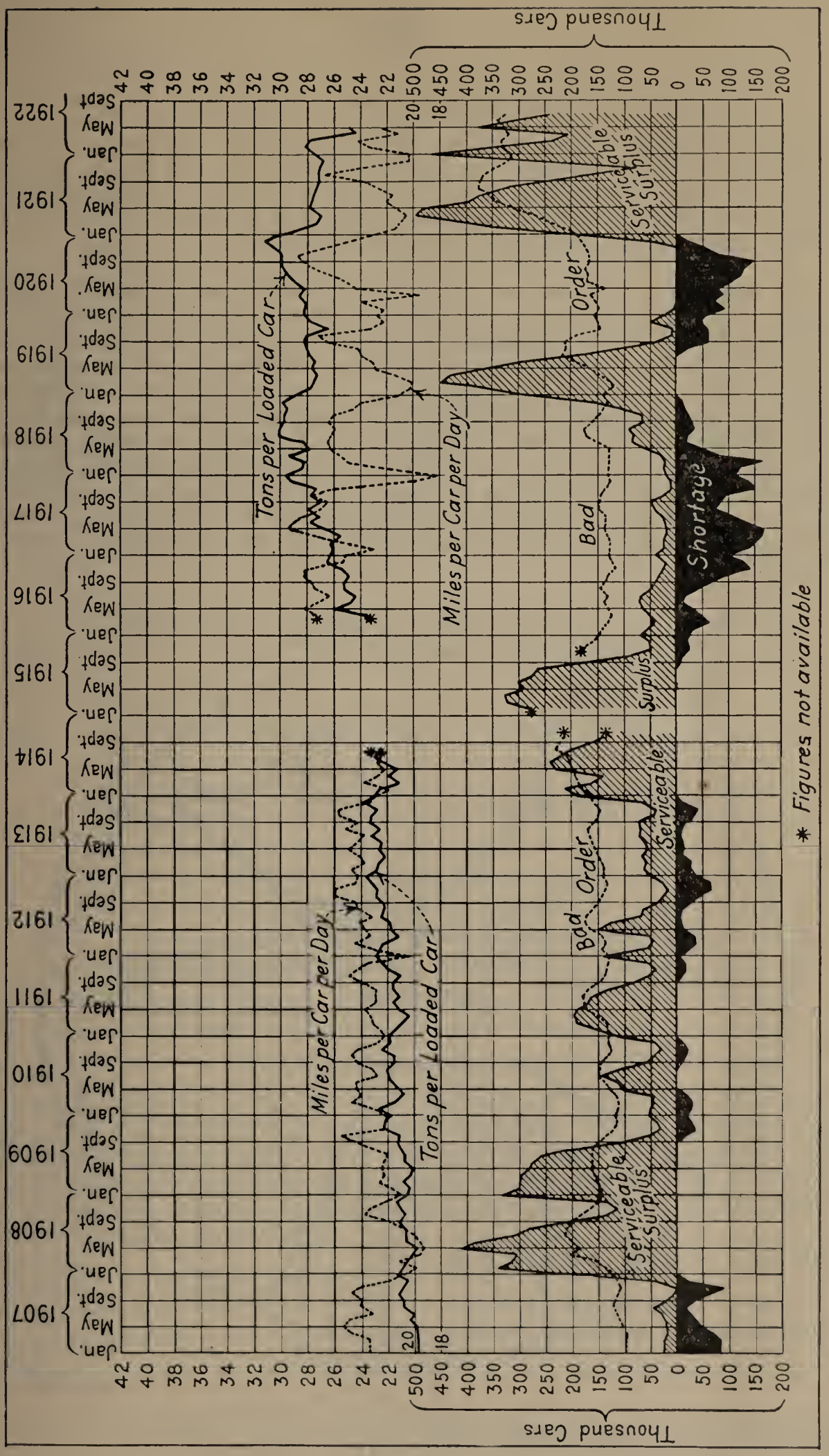


FIG. 10

R. R. Surplus—Shortage Curves A. R. A.

WHAT HAS OUR TRANSPORT MACHINE COST?

Investment cost must enter into our future problem, not only from the viewpoint of judicious investment in the best form of carrier plant, but also of limited capital supply, for only within the last decade, the transport plant has commandeered 23 billions new capital, almost as much as our present national debt.

To keep our perspective, your attention is now called to an approximation or engineering estimate of what transportation has cost the country. Before venturing upon such an estimate, records were scoured for collective information thereon, without much success, and to make doubly sure, these estimates were submitted to numerous authorities for comment, with resulting unanimity on some points, and wide discrepancy on others. We may rest, however, on this assurance, that if you agreee to the basis of an approximate pre-war level of evaluation without deduction for accrued depreciation or the violent deflation in values brought about by the absence of a "going" market such as in shipping, the following results will at least prove a reasonable guide.

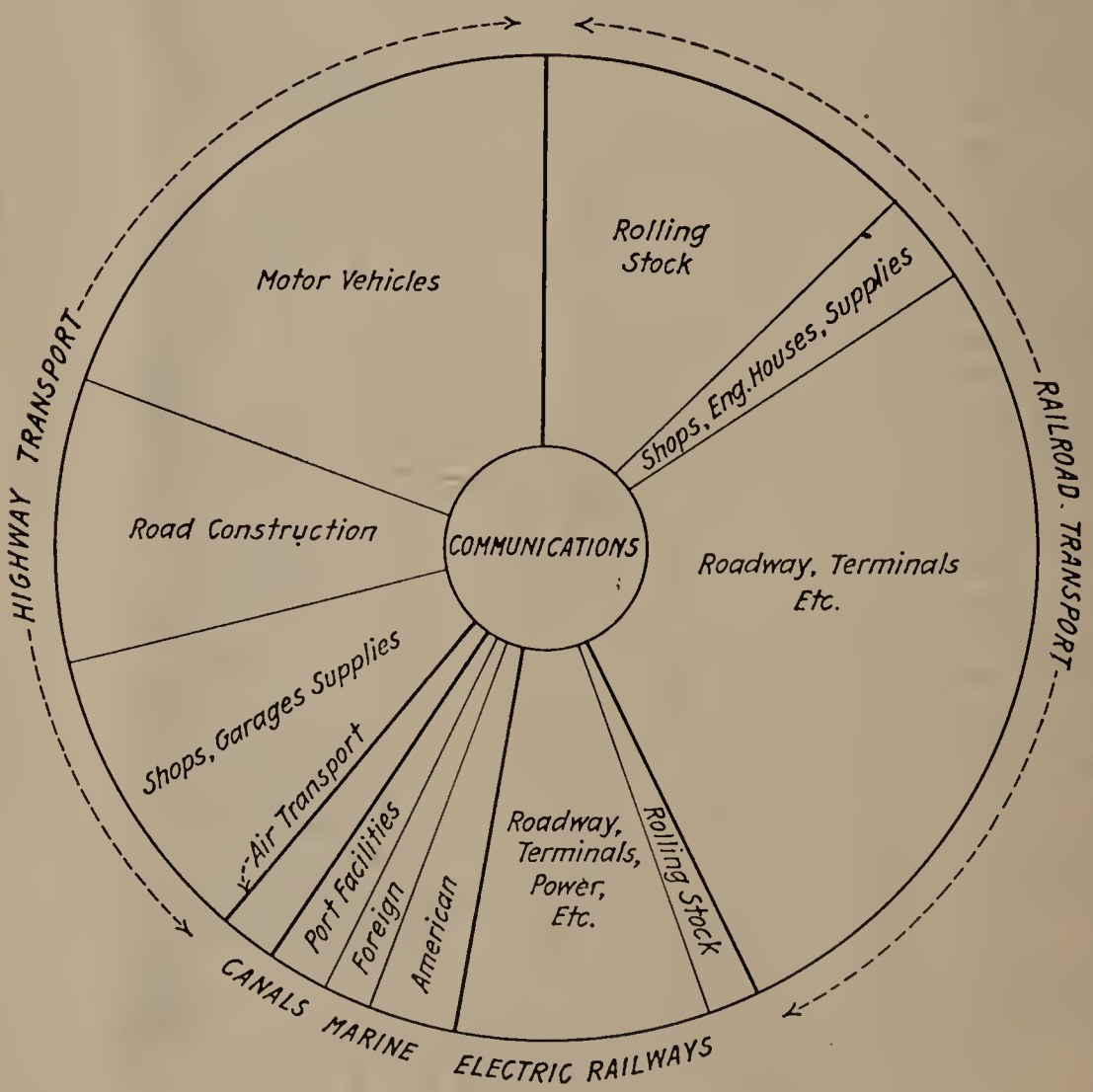


FIG. 11

50 Billion Diagram—Investment

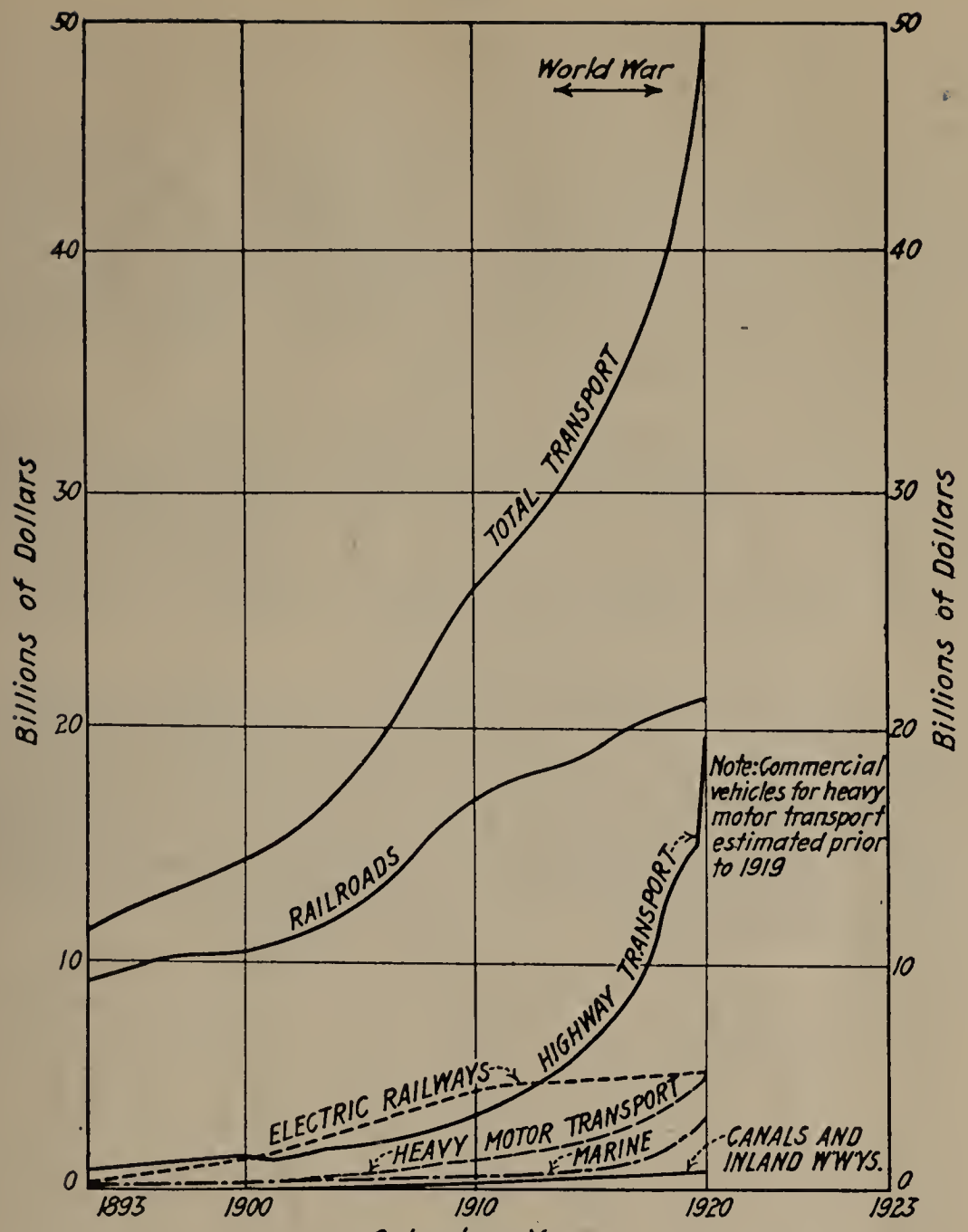


FIG. 12

Growth Curves—Investment

Transportation is found to be the second industry in the United States, for to build it has cost approximately $50,000,000,000, twice our present national debt. It is thus second only to agriculture, $80,000,000,000, and exceeding manufacturing, $45,000,000,000. Considering the various agencies as a complete operating plant, the segregation is approximately as follows:

Railroads,	21	billion dollars	Approx. Cost Ratio
Highways and motor transport,	19.2	" "	
Electric railways,	5	" "	2 2 1
Merchant Marine,	2.8	" "	(RRs.) (Hwy.) (Other)
Canals,	1	" "	
Port facilities,	1	" "	
Total,	50	billion dollars	Electric communications not included, 1.9 billions

Air transport, express, parcel post, not estimated because the facts were not available.

Here, highway transport includes cost of road improvement, and shipping, the quota of foreign tonnage used in our commerce.

Looking into the past the record of growth is equally amazing. Starting from $11,000,000,000 in 1890, (for the whole plant), the transportation plant grew slowly to 14.4 billion in 1900, then more rapidly to 26.2 billion in 1910, and then to the extraordinary total of $50,000,000,000 by 1920. In this expansion railroads held the stage from 1900 to 1910, likewise electric railways. Since 1910, however, highway transport has been responsible for the record growth, also shipping since the beginning of the war.

It is food for thought that, in the last decade, motor transport commanded nearly four times as much new capital-input as the railroads—nearly $16,000,000,000—while during the preceding decade (ending 1910) the reverse was almost true, $2,000,000,000 for highways as against $6,500,000,000 for railroads. In other words, in the last decade, motor transport has called for over two-thirds of the capital input of the whole transport system.

On a per capita basis this transport cost has increased from $174 in 1890, to $465 in 1920. Both railroad and electric railway costs per capita have remained practically stationary during the last decade; but highway transport increased from $39 to $182 per capita. There are only 41,000,000 workers for profit in the U. S.; this means an investment today of over $1,200 per worker—to enable him to live and work—quite a respectable sum. For the worker eventually has to foot the bill through rates.

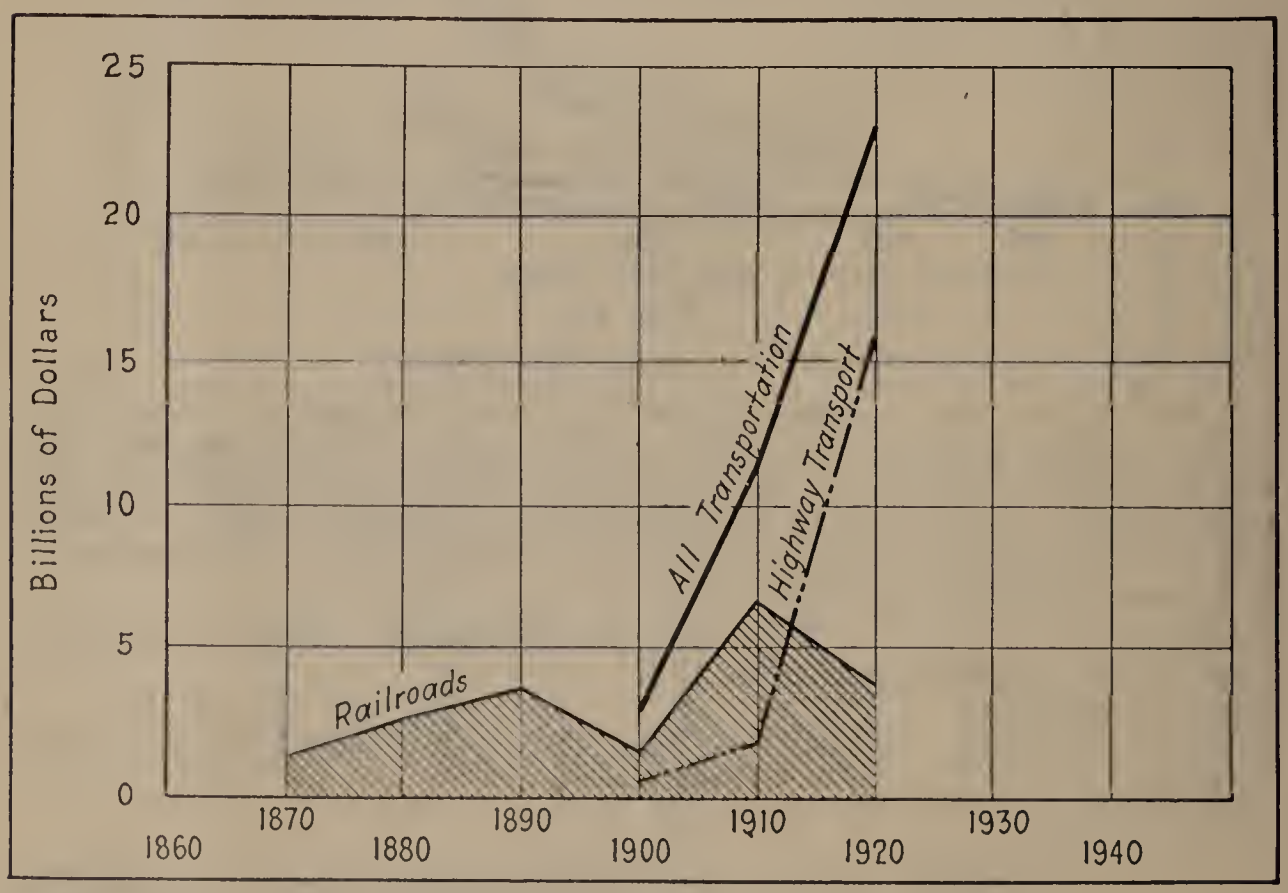


FIG. 13

Capital Input—10 Year Periods

THE LONG VIEW AHEAD

What of the future? We have only history as an index, but that history happens to be strikingly consistent. At the time of the Civil War, railroads handled 100,000,000 tons of freight per year; at the end of the century, 1,000,000,000 tons; today, 25,000,000,000 tons revenue freight. Despite temporary recessions, the trend is steadily upward. And ton mileage is running consistently ahead of the tonnage because of increasing average length of haul. Fortunately, the investment cost per ton handled has reduced from $17 in 1880, to around $8 in 1920, (including passenger facilities.) But during the last 20 years little reduction has been made, in spite of increased traffic and efficiency—a fact which seems to indicate that the majority of the new capital has gone into expensive terminals, which is also indicated by an analysis of mileage additions through the years.

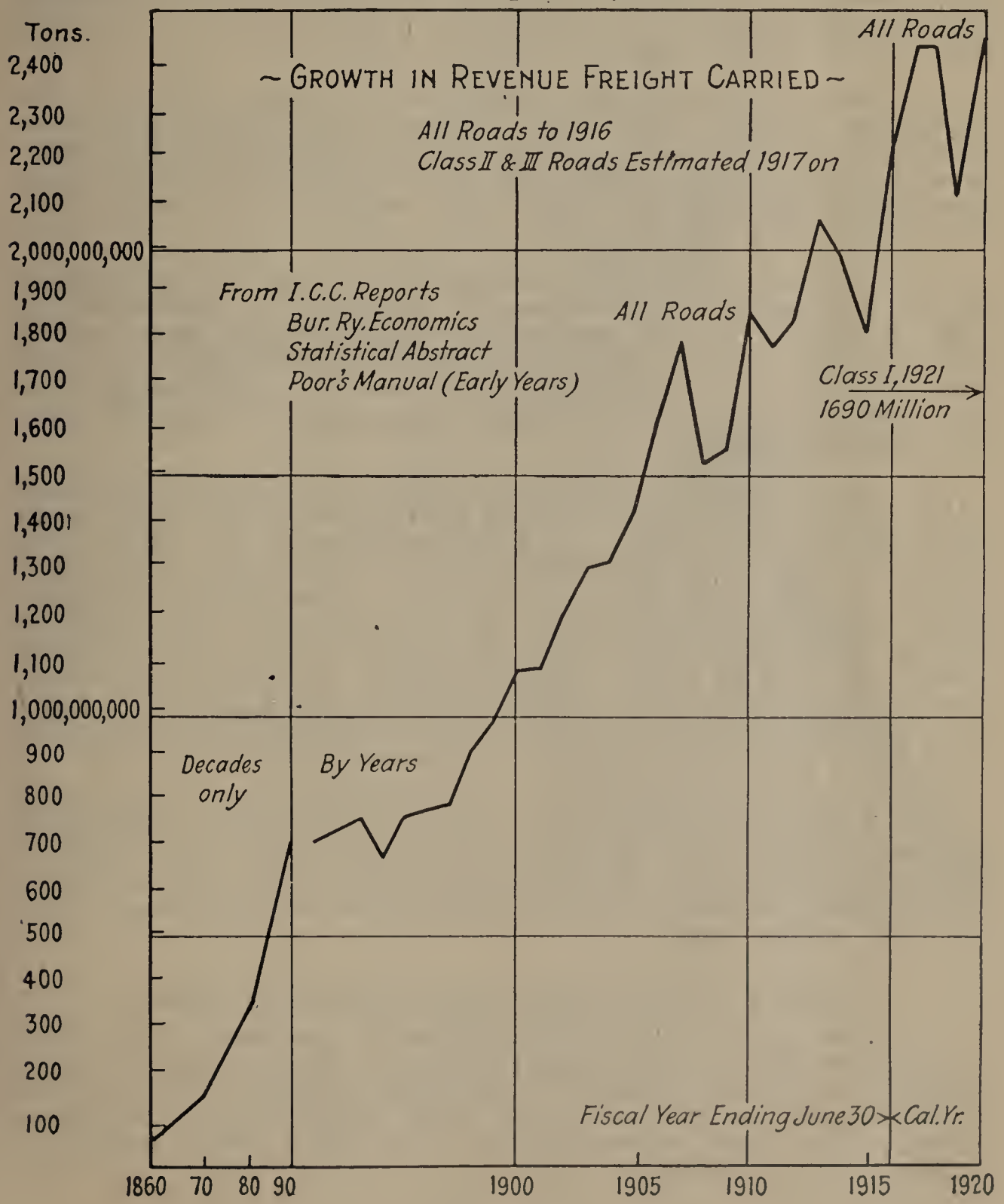


FIG. 14
Railroad Tonnage.

All these data point to the fact that if, this minute, we could press a magic button and double the facilities for handling rail tonnage, these facilities would last perhaps only 15 years. For this tonnage last doubled in 12, 14 and 18 years, successively.

The surest record is the relation between transportation, population and commerce. If plotted to a logarithmic scale to "straighten out the curves," the record shows practically a straight line increase in tonnage since 1860, likewise ton mileage since 1880, passenger mileage since 1900, and railroad investment since 1870 except for two slumps, 1890 to 1900, and 1910 to 1920. This means that the basic traffic requirements of the country have increased consistently—not only as fast as the population, but as the square or cube of the population. Similarly, post office receipts (a good index of small business), steel tonnage, coal tonnage, have also increased in a definite ratio, always much faster than the population. Manufactures and mineral production have increased even faster.

In transport facilities, track mileage has increased faster than the population, even with the slump of the last decade; freight cars, about as fast as the tonnage (up to the war); locomotive tractive effort somewhat faster than ton mileage. But the cost of highways transport and the resulting total cost of all transportation has exceeded all precedents in rate of growth.

For the future we may tie to the basic tonnage (or ton mileage) as our best index, and assuming the population of 130,000,000 by 1940, a revenue traffic of nearly 4,000,000,000 tons per year must be provided for. To meet this growth, at least $10,000,000,000 of new capital must be found, neglecting that needed to make up for war-time disarrangement. That is, our railroad plant will then have cost over $30,000,000,000.

It would be a wise prophet indeed that could foretell the balance of the future investment, including highway transport. Even using the 1920 investment ratio of 2-2-1 (rail, highway, and other) there would be required $15,000,000,000 more, or $25,000,000,000 total new capital by 1940. Moreover, by that time at least half of the entire plant, depreciable items, will have gone to the scrap heap, requiring another $25,000,000,000 for renewals. This means a capital turn-over during the next 20 years of $50,000,000,000, or equal to the entire present plant. It is incredible that the railroad development is going to stop; it is more likely that other transport will advance, so that these total figures cited are probably far too conservative.

One great point stands out in this analysis: that the utmost economy in facilities and draft on the capital supply is a public need, particularly during the long drawn-out process of war time deflation. What we need most is the lowest possible transport cost per ton, or per ton mile, and the quickest possible service or turn-around, whatever the method used.

WHAT DO WE MEAN BY CO-ORDINATION?

It must now be evident that any narrow conception of this much abused term will miss the broader objective. We have simply allowed ourselves to become befogged by emergent conditions. Co-ordination is nothing new; precedents abound. And the first key to the solution seems to be, better understanding of the facts and a meeting of minds on their significance.

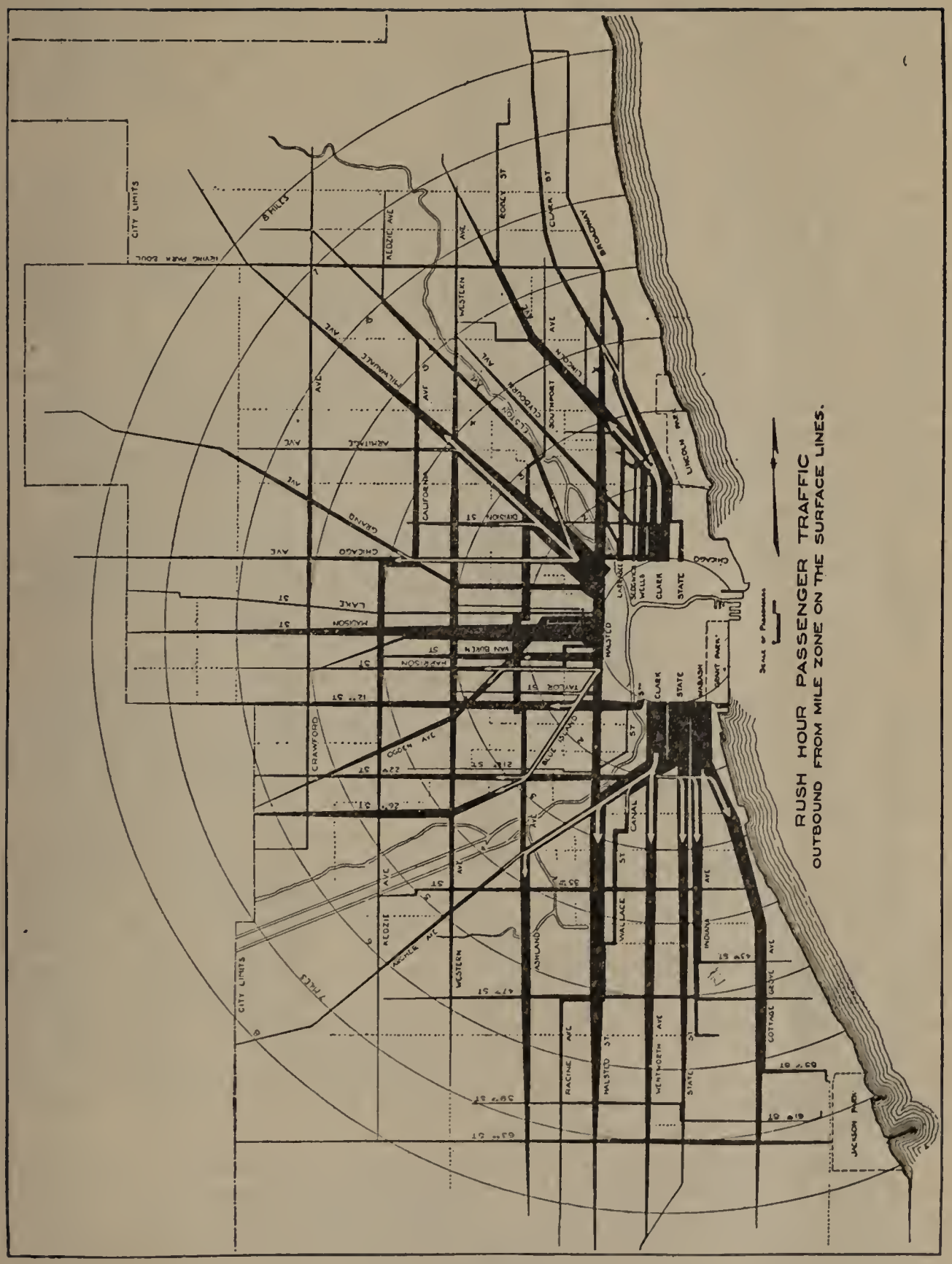


FIG. 15

Chicago Traction (Passenger Flow Diagram)

Not long ago we were at the apex of misunderstanding, involving railroads, terminal rights, waterways, trolleys, highways, jitneys, motor trucks, coastwise shipping, and parcel post express—essentially a three-cornered battle of rail, road, water. We might call it "the late unpleasantness," reminiscent of Sir Lucius O'Trigger in "The Rivals." But conditions are changing, and we find now an honest effort toward a co-operative solution, as envisaged in the Transportation Act, which ought to have a fair trial.

Not many years ago everybody changed cars at Buffalo; the express company has not always delivered your trunk; only recently were you able to send telegrams from your bedside telephone; the Hague Rules for a standard through marine bill of lading are only now in formation. Nevertheless, railroads did evolve standardization in track gauge, clearances and equipment parts, the great Chicago Belt Line and clearing yard, union terminals like St. Louis and Washington, central ticket offices, joint rates, through routes and bills of lading, transcontinental lines from coast to coast, (Canada), rail-water lines (Southern Pacific, Morgan Line), store door delivery in England and Canada (originally in Baltimore and Washington), and also during the war, central car and terminal control. We do not need precedents, but a further development of better contacts, physical and mental, and a general speeding-up.

These physical contacts in general are (1) the port-terminal, (2) interchange, belt-line and clearing, (3) harbor lighterage, (4) the barge-terminal, (5) the truck platform at freight stations, (6) rural motor express, (7) local distributors such as the Chicago freight tunnel, (8) unit container and tractor trailers.

But these cannot be developed alone as a technical problem, for there are the other human and political factors involved—the public, investor, management and men, the regulative authorities, and especially the city authorities who are striving to re-design their cities so as to keep apace with business activity and insure reasonably healthful community life, physical and social.

Further possibilities of co-ordination seem to offer great hope. Railroad consolidation, once denounced, now seems imperative, as competition has largely drifted down to service and facilities, especially terminal facilities. It is now under study by the best minds of the country. But consolidation of lines will not alone solve the terminal problem, or co-ordination with other agencies. In fact, the terminal phase has received but scant attention up to the present time, and if some of the proposed consolidations are carried out, there will be little change in the terminal situation unless there is a still further meeting of minds. Unification of terminal operations, irrespective of financial control, when worked out on a basis of complete equity, must logically go with consolidation.

Port-terminal development has only gotten a fair start. The bulkhead line is still too much of a division point between the railroad on the land side, and shipping on the water side, which services should be closer welded. And in this connection, supporting warehouse development and transit-storage facilities are greatly needed to reduce the turn-around time, both ship and car.

Then will come a real through bill of lading, producer-to-consumer.

Rail-barge-canal service, with more suitable transshipment facilities, must receive more study. Political argumentation or regional jealousy will never accomplish, but only delay, transport improvement.

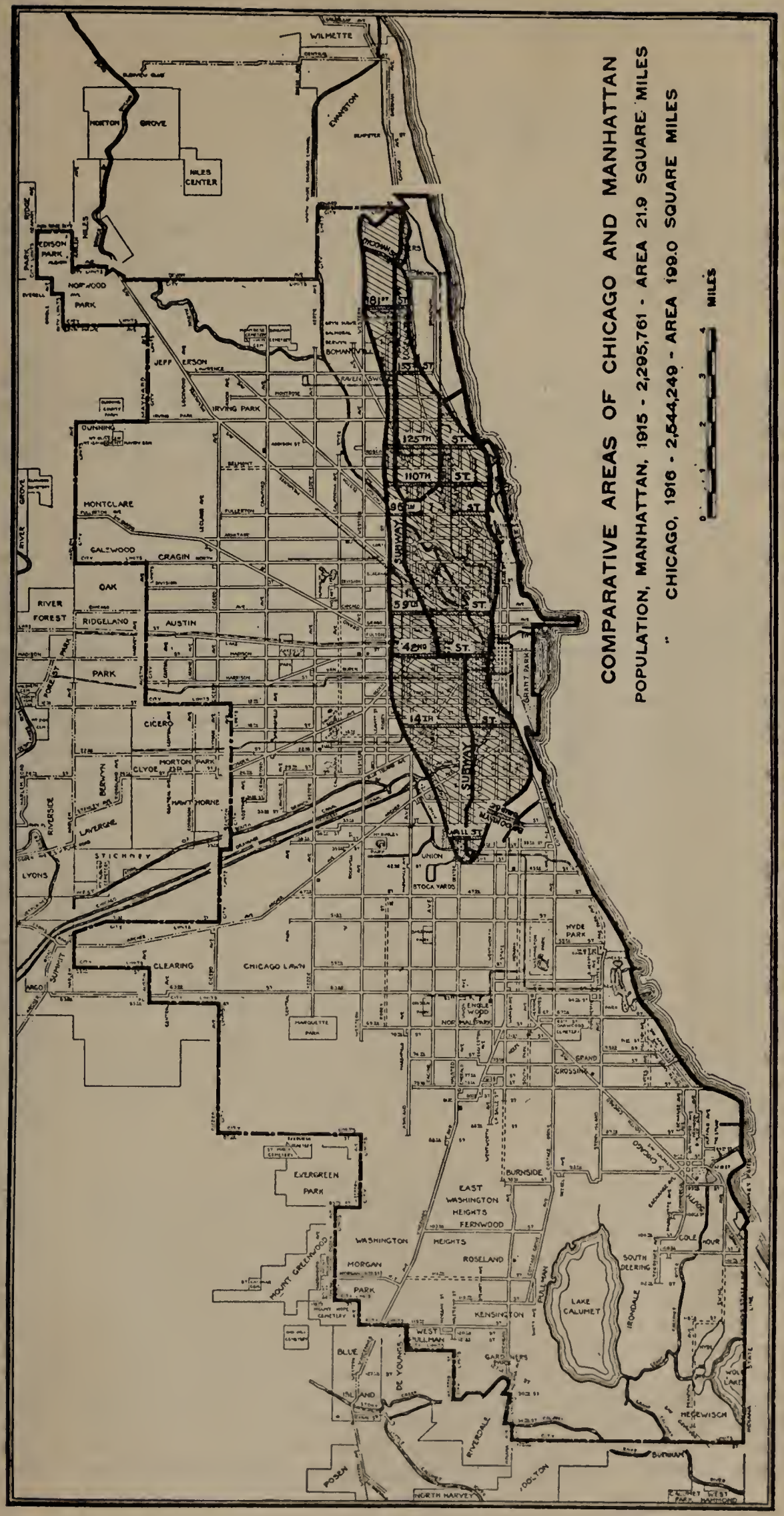


FIG. 16

New York on Chicago (Map)

Union L. C. L. freight houses for small manufacturing and business holds great possibilities, perhaps as an intermediate step to universal stoor-door delivery.

Short haul transport, rail vs. motor, must bc detcrmined by economic standards rather than by destructive competition, or we will have in motor transport an exaggerated "jitney" situation with its unexcusable wastage of capital assets, just as in city transit; likewise, waterways operations, by the same economic measuring stick.

The standard unit container for rail, motor, trolley, barge, and perhaps shipping, alone seems to offer the greatest problem of standardization for the country. Imagine 57 varieties of standard containers, which will certainly come, if the situation is allowed to drift. Even now various containers are used in railroad, electric railway, motor and barge service.

Two important investigations now under way will aid in this problem of co-ordination, first, the Interstate Commerce Commission's study of the New York Port Authority Plan; and second, its decision in the Mississippi-Warrior Barge Line case. Except for certain ex-lake traffic via N. Y. Barge Canal into New England, this Mississippi development establishes a precedent of the greatest significance in American rail-waterway co-ordination, despite the fact that the Rhine Port of Mannheim has for years been the real seaport of Baden and Bavaria, the great transshipment point, river-to-rail, at the head waters of the middle Rhine. By the Commission's decision, the Government's economic experiment on the greatest of the world's inland water courses is recognized as a potential resource in transport service and economy, to be worked out fairly by the parties interested. Even today this great trunk river is the funnel through which freight originating or destined within the territory from Pennsylvania to Montana may reach Gulf tidewater at 20 per cent. under all-rail rates and as a practically self-supporting enterprise. The recent decision, with reasonable limitations, considerably expands this territory. And it should be emphasized that private operation of these waterways is unquestionably the end in view. The fairest objective would seem to be that waterways development should proceed in such a manner that the ultimate economics of water carriage may be worked back into the connecting rail system, perhaps by some contract-agency plan, so as to secure maximum transport economy for the region as a whole, rather than profit for the water carrier or shipper who happens to be favored in location.

Co-ordination is an economic, as well as a technical problem. How can the facts be assembled for the basis of a real solution? Partial or individual solutions are no solutions at all in the long run. We argue too much from principles and obsessions, rather than realities. Has the time not come to undertake broad factual surveys of transportation needs, local as well as national? The coal industry is no more complex a subject. A national transportation inquiry has already been attempted with results most valuable, but admittedly incomplete, for the subject was too big for quick action. Do we not need more intensive analysis, starting with the big centers—the terminals, each with its individual community and operating problems? Some progress has already been made, notably in New York, Chicago, New Orleans, and St. Louis, but this is only a beginning.

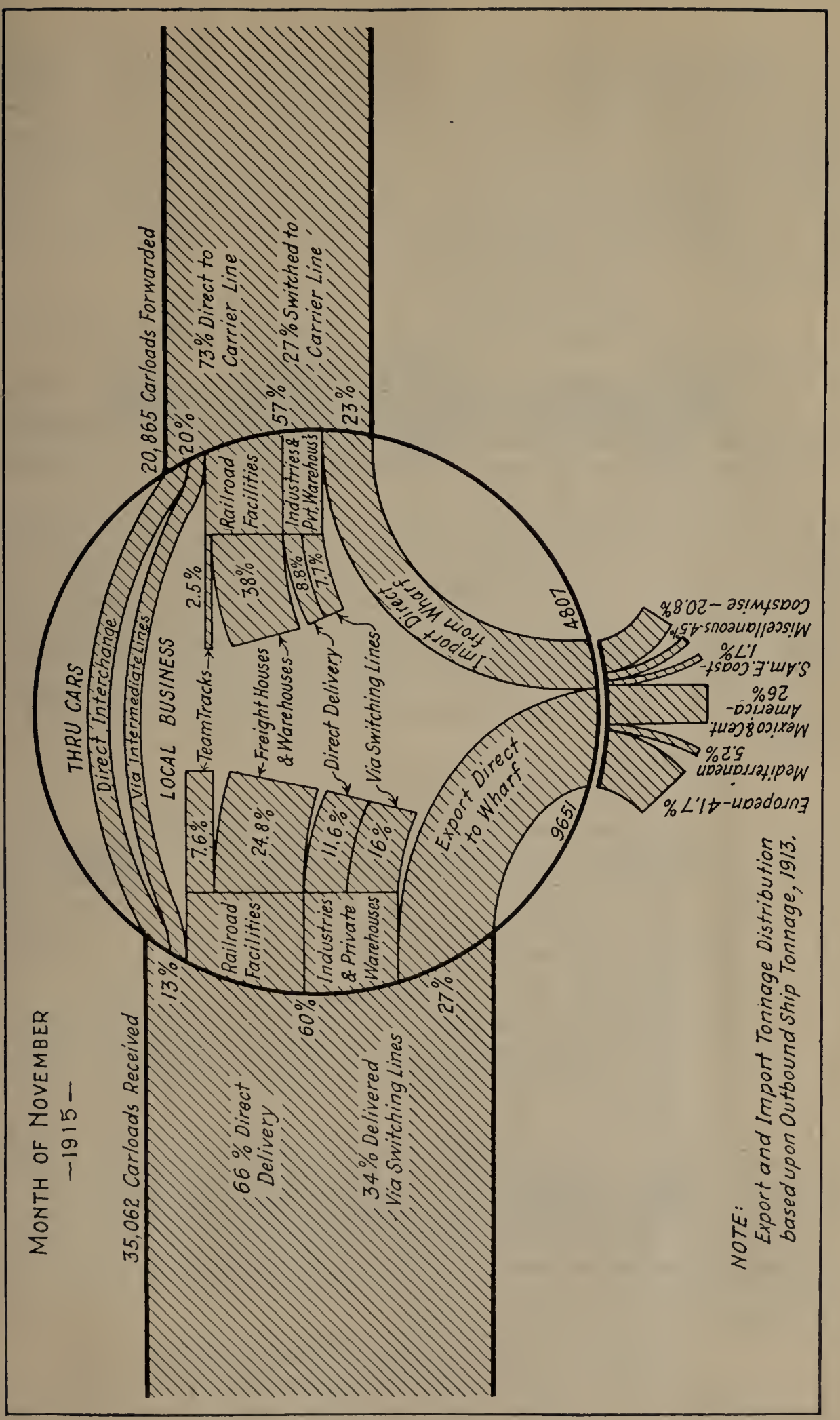


FIG. 17

Railroad Traffic Flow Diagram

Terminal investment ought to give one index of its relative importance in the scheme of things. Considering the whole railroad mileage and the relative value of lands and facilities, it is probably no exaggeration to say that half of the cost of the railroads, or $10,000,000,000, represents the cost of providing facilities other than main line tracks, largely terminals, and it is probably equally true that it costs as much annually to handle freight to and from railroads, as to haul it on the rails—some $4,000,000,000 or $5,000,000,000 per year. *This is a large part of the terminal problem.*

TWO IMMEDIATE NECESSITIES

Therefore, it seems clear that we need most in this country, and promptly:

1. Metropolitan District Transportation Plans of the larger industrial districts, ports and gateways, and
2. Terminal planning based upon fact surveys, which will merge into the larger Metropolitan Plans.

Boston has already taken the lead in the planning of a metropolitan district, first for water supply and drainage, and now for transportation. New York is well into its regional plan. Chicago is just starting action on a much larger scale than its original city plan, and other cities, Los Angeles, Baltimore, etc., are getting interested. But we should not stop with the big gateways, for cities grow almost over night, viz., Los Angeles, and the motor city of Flint, Michigan, with 7,000 people in 1900, and not far from 100,000 today.

Some elements of a Metropolitan District Transportation Plan are briefly:

a. Streets and highways.
b. Transit—local and interurban.
c. Traffic organization and regulation.
d. Railroads, passenger entrances and terminals.
e. Railroad freight lines, terminals and clearings.
f. Freight transfer and delivery, city and suburban.
g. Port terminals and barge terminals.
h. Grade separation—way and traffic.
i. Warehousing—local and marine.
j. Air ports and air ways.
k. Industrial expansion and zoning.
l. Relation to the general City Plan—governing all other city features such as parks, public buildings, schools, water supply and drainage, and all matters of civic welfare.

We cannot stop to develop this vast subject here. It suffices to say that many so-called City Plans have discounted or failed to evaluate the full importance of transportation, especially your unaesthetic railroad facilities—largely because of insufficient study.

We may note in passing that the Metropolitan District system of controlling civic development may point out a way for securing practicable "Home Rule," by providing the needed balance and check upon over-zealous local city governments.

WHAT A TERMINAL SURVEY SHOWS

First off, political boundaries should not limit the study. The terminal plan starts with a study of traffic movement and the relative placement and use of facilities. It should comprehend the function of street railway service, the street and highway plan, characteristics

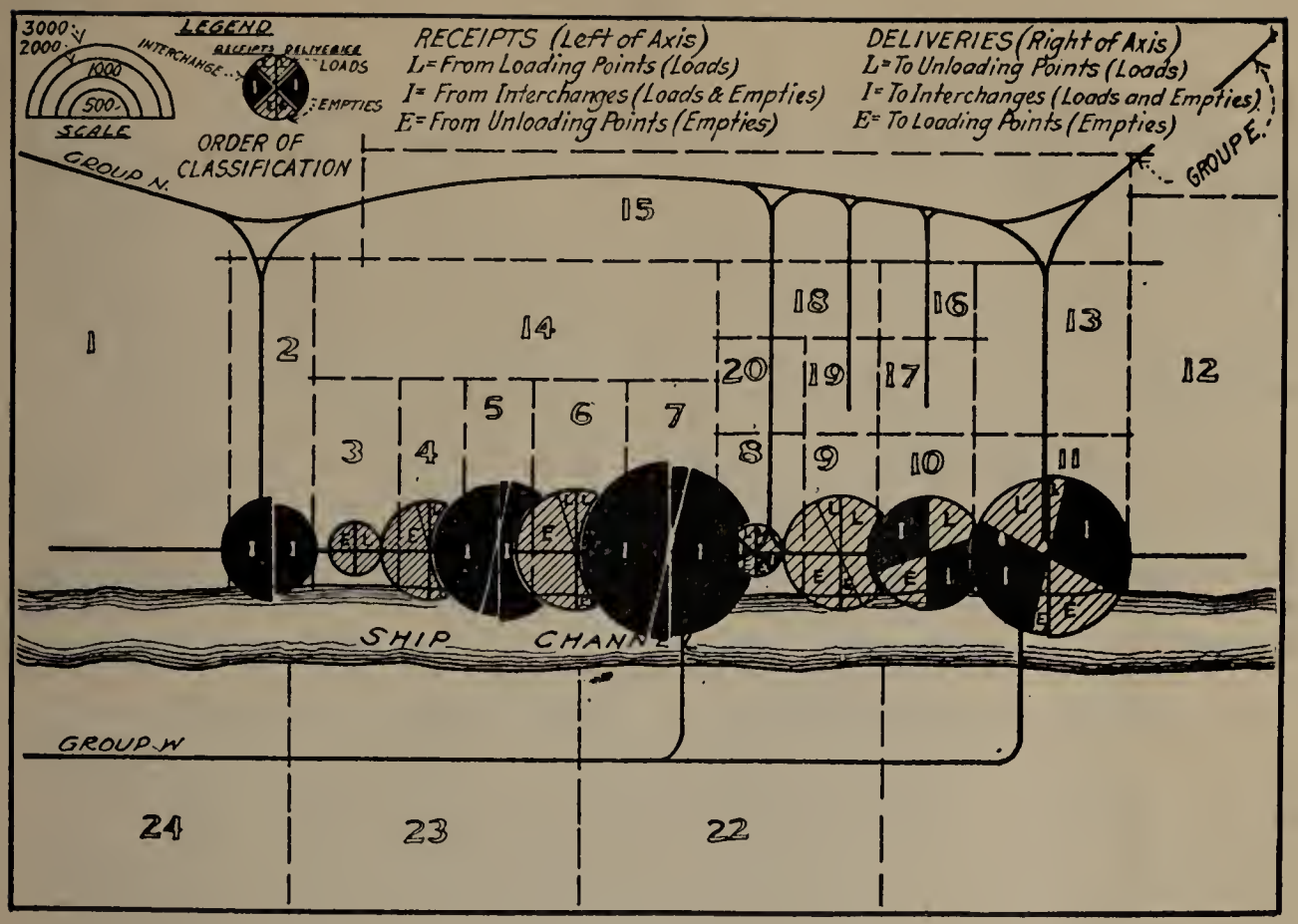


FIG. 18

Belt Railroad Diagram (Fig. 1)

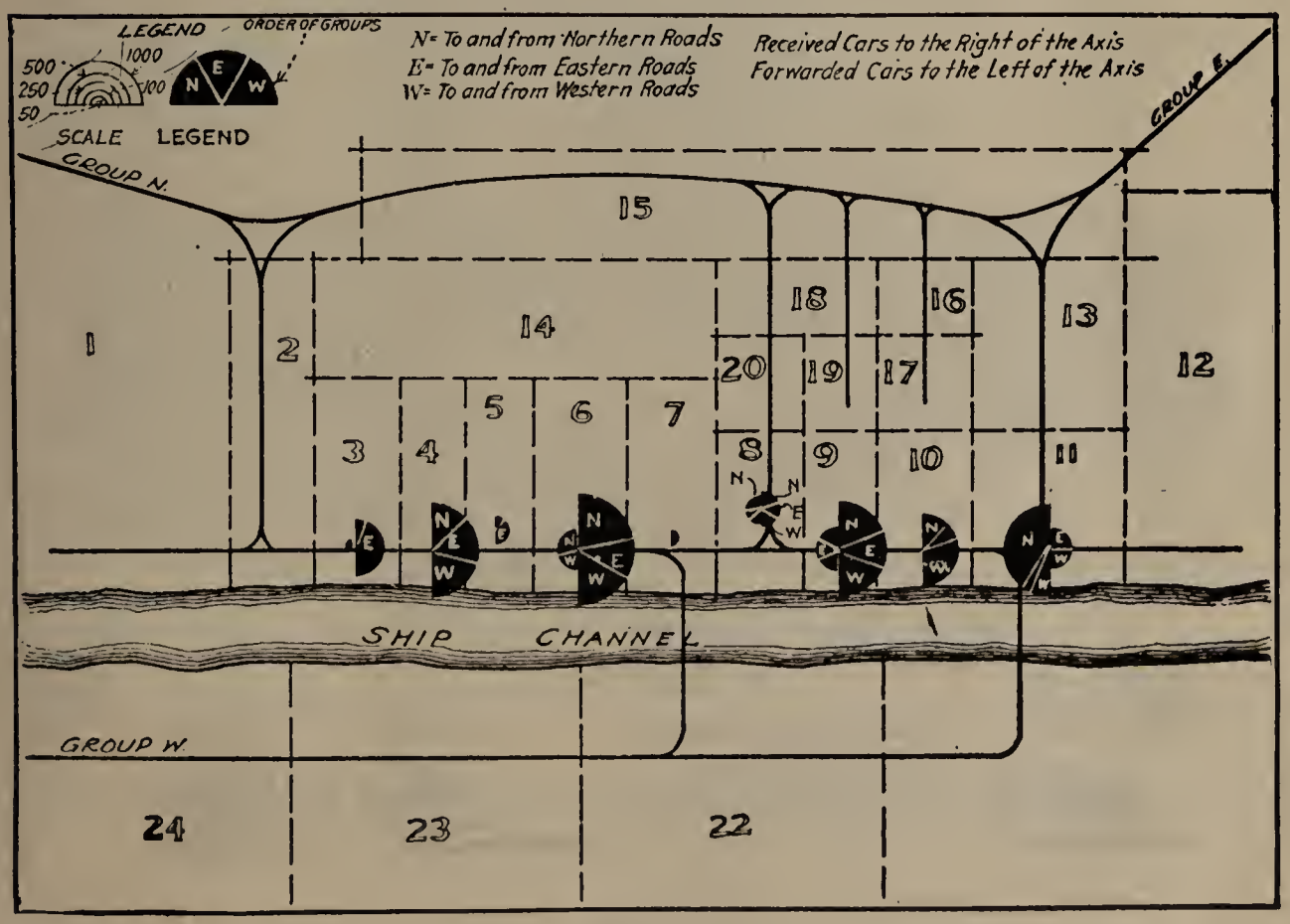


FIG. 19

Belt Railroad Useful Work (Fig. 2)

of street traffic and tendencies, the effect on zoning and other features of the City Plan. It should analyze land values and practicable use in proportion thereto with the development of valuable "air rights," always in view. It should develop proper and improper points for classification and clearing operation, economic location and use of freight terminal facilities, for shipping, warehouse, industrial, and local traffic, the best relation to city markets. And it should develop possibilities of by-passing through street traffic and rail traffic, to relieve local facilities which should not be burdened therewith. This involves a careful study of street capacity in its relation to the City Plan.

The most illuminating results are shown by origin and destination counts of traffic—rail, highway, and passenger and workers, each giving a graphic picture of where business is done within the terminal district, the heavy traffic routes and points of congestion and the possibilities of relief. Some results from the writer's experience may be mentioned.

Some Actual Conditions

In one great port-city, the Belt-Line was found operating practically without clearing yards, and doing most of its interchange right in the thick of the water front traffic which should have been entirely devoted to marine purposes. Result—much needless interference and extra movement; competing roads threading their way through and across other's facilities; one road operating 48 terminal tracks from one switch-back; local freight handled in the marine zone with most difficult access to city markets. A re-design readily cleared up this belt line trouble.

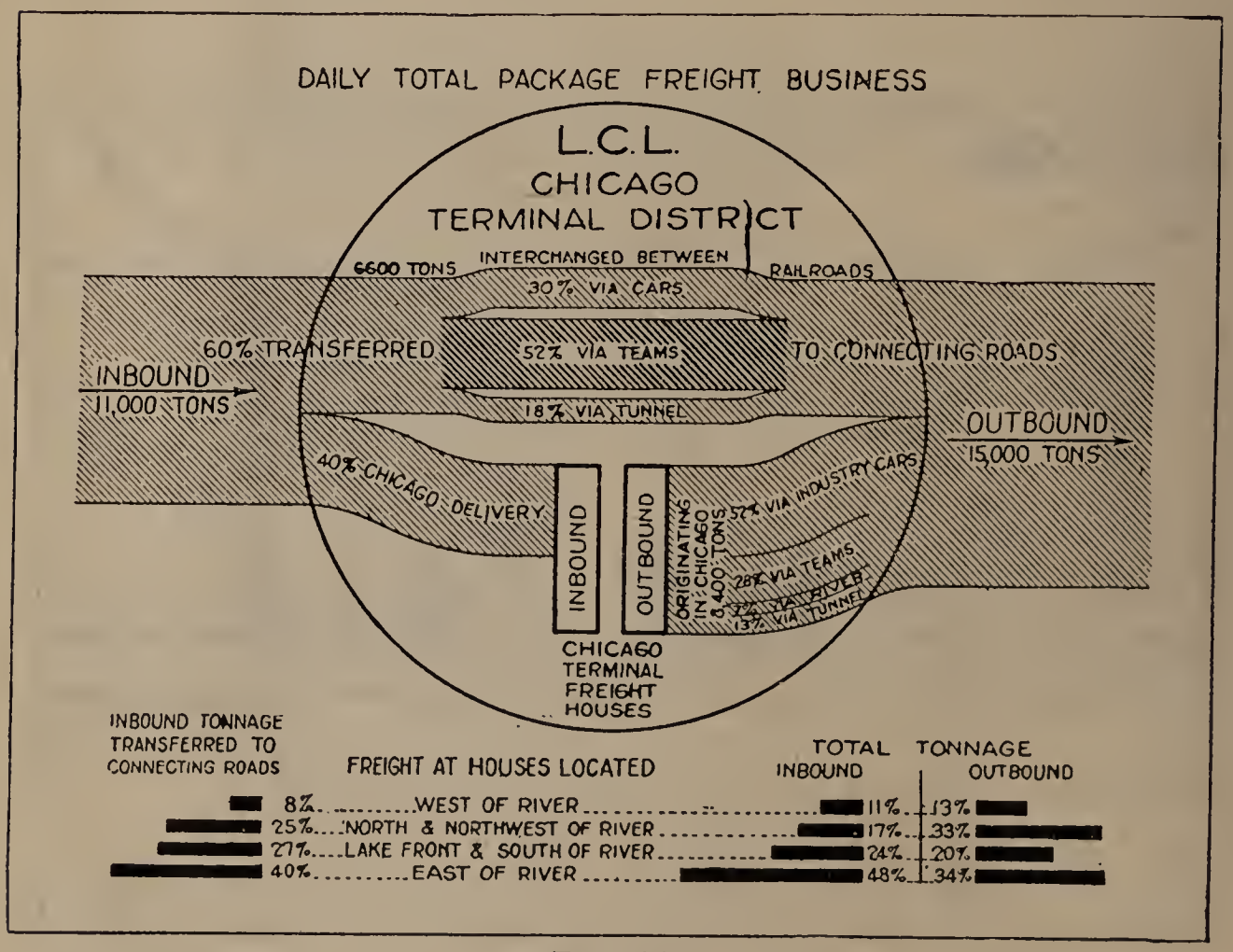


Fig. 20
L. C. L. Flow Chart, Chicago

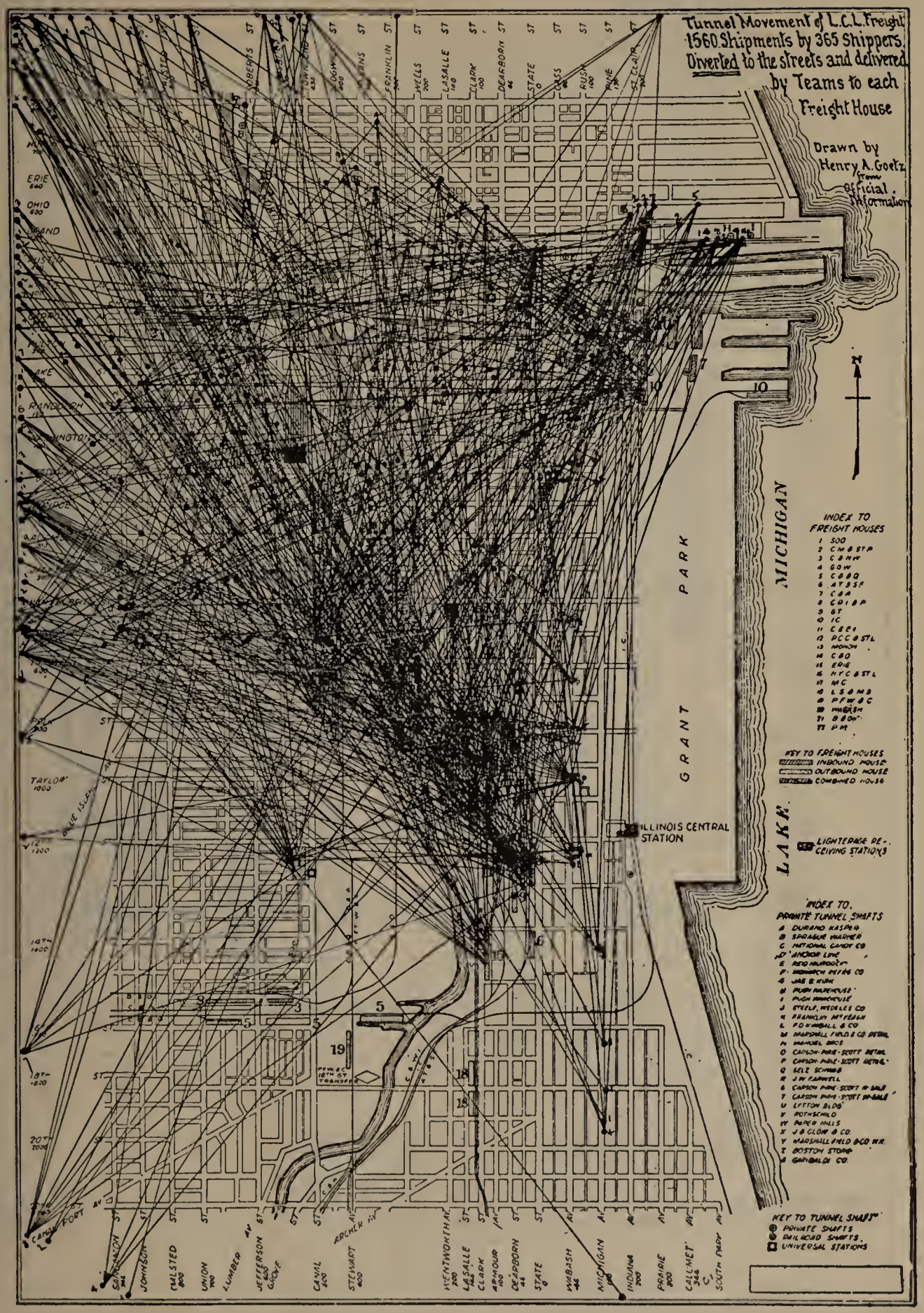


FIG. 21

Trucking Chart (Chicago Terminal)

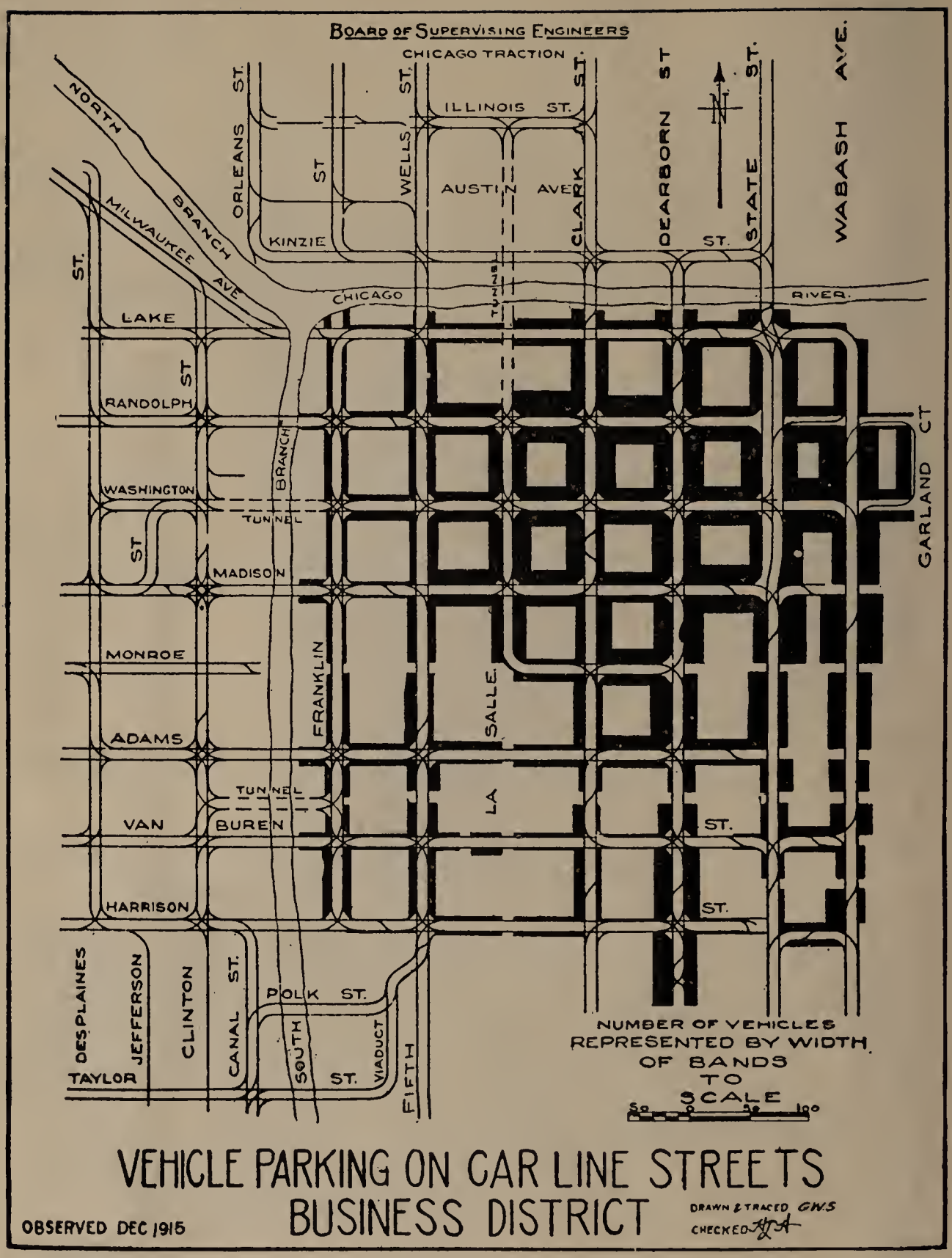


FIG. 22

Parking Diagram (Chicago Terminal)

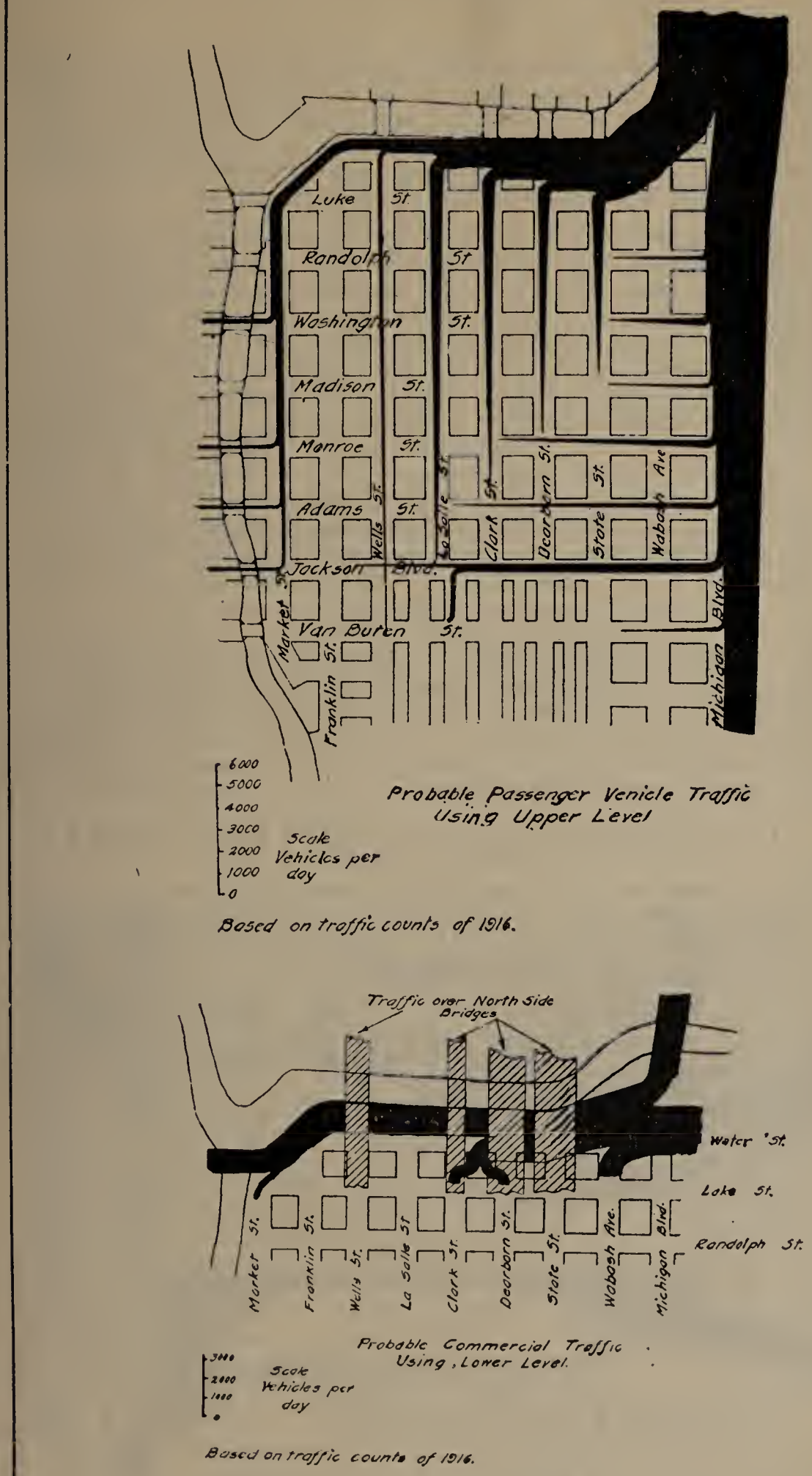


FIG. 23

Traffic Flow Diagrams (Chicago Terminal)
Upper and Lower Level (So. Water St.)

In Baltimore, the controlling grade of the whole seaboard trunk system lies in the two passenger tunnels with no by-pass relief freight line around the city. In Syracuse, a great trunk line still runs along the surface of an important city street axis. In Cleveland, all the lake front lines thread themselves through a single track draw-bridge over the Cuyahoga river, unless it has changed recently.

The importance of belt line clearing varies greatly in different cities. In Chicago over half of the car movement is through interchange—only 17 per cent. in New York, and the same in New Orleans, although there 25 per cent. more is through business, export and import. Again, in Chicago over 60 per cent. of the L. C. L. inbound traffic is through interchange, despite trap-cars and tunnel, and half of this is trucked through the city streets of the down town district, an area only eight blocks wide by 12 blocks long, the business and social center of a community of 3,000,000 people. Chicago "Clearing" has been worked out for car load business with a capacity of 10,000 cars per day, but not for L. C. L. This is another matter, and even more complex, owing to the problem of *pre-classification*, and re-handling at break-up yards, which is also in evidence in the New York situation.

Chicago's Freight Tunnel

Sixty-five miles in length, stands unique in terminal service as the first complete sub-level street system in the world devoted to freight handling. It inter-connects all railroad stations and most large freight handling buildings down town. But it has no L. C. L. clearing

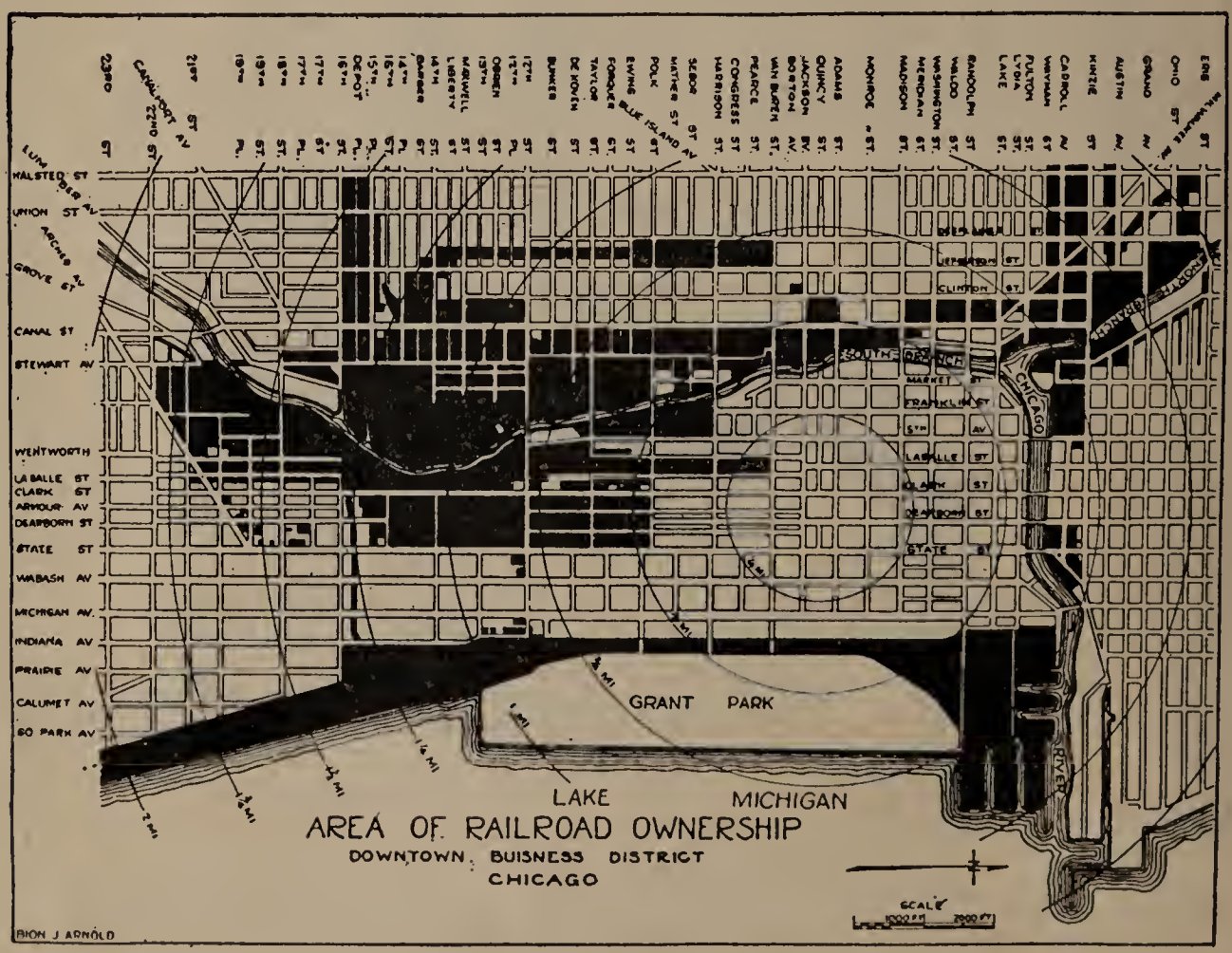


Fig. 24

Rail Ownership of Lands (Chicago)

point, and operates as an independent entity whose charges have to be absorbed, reluctantly, by the railroads. Hence its capacity has never been more than partly realized. Yet even now it removes daily from the city streets nearly 1,000 truck loads which would otherwise only add one-third to the congestion.

Street Traffic Congestion an Important Problem

A recent Chicago count showed that there were as many motor car movements in and out of the Loop during the business day as the total number registered within the city. In spite of railroad trap-car service, interline trucking persists, adding to the growing congestion. A count made at one of the out-bound freight houses showed the peak movement of trucks occurred in the height of the evening rush hour along one of the most important passenger arteries and car line streets.

Traffic Segregation

Chicago has made a start in traffic segregation by two-level streets or Marginal Way around the Loop district (called the South Water Street Improvement.) This great project provides a low-level by-pass trucking route between railroads, practically without grade, and a broad over-head street for high speed traffic connecting with all the river bridge crossings. The tremendous rise in land values as a result of this coverage of unsightly freighting movement is expected to pay largely for the improvement. Cleveland has utilized its natural topography for rail entrance in the basement and street service from the upper floor of its warehouse terminal. Baltimore has developed an open nuisance into a most useful covered street—the Fallsway.

Use and Development of Lands

This emphasizes a point of great importance. In Chicago more land is occupied in the down town district on both sides of the river than used for commercial business. Until recently, terminal construction of 40 years ago prevailed. Immensely valuable lands within this district were used for storing cars, for building materials, etc. One old freight house even held onto one-half of the channel of the Chicago river until dispossessed by the great Union Station improvement and every road held to its own terminals. Result—a Chinese Wall around the Loop district through which local business and population had to filter, morning and night. But this is changing. Immense new terminals have been constructed, and more are under way. A sharp bend in the river will be straightened with the result that the increased land values will pay for the whole improvement. Development of "air rights" are being planned on an enormous scale, with obvious advantage to the City Plan. But there seems a great reluctance to recede either passenger or freight terminals in conformity with the expansion of the business district. It is a great question whether this resistance is economic or far-sighted procedure.

A profile of land values taken along the axis—State Street—shows most clearly the effect of the iron band of transportation, with tremendously high values within the Loop and greatly depreciated values just outside. Business districts must expand, and freight developments eventually, if not now, will adjust themselves to this expansion. The more intensive use of these outer zones will find an instantaneous response in earning value, more than sufficient to warrant the change.

Function of the Motor

This is the one distinctly new element. With or without store door delivery, the motor appears to offer the connecting link so long needed to enable railroads to recede their facilities before advancing business. It may be the much needed interim measure to salvage present terminal values and avoid tremendous new terminal investments prior to general electrification. One Chicago road estimates that it could afford to relocate its down town terminals as far south as 33rd Street and still handle its local tonnage by motors with equal profit. Few cities can afford freight tunnels, such as that of Chicago, or as proposed in New York City. The motor seems to be the alternative.

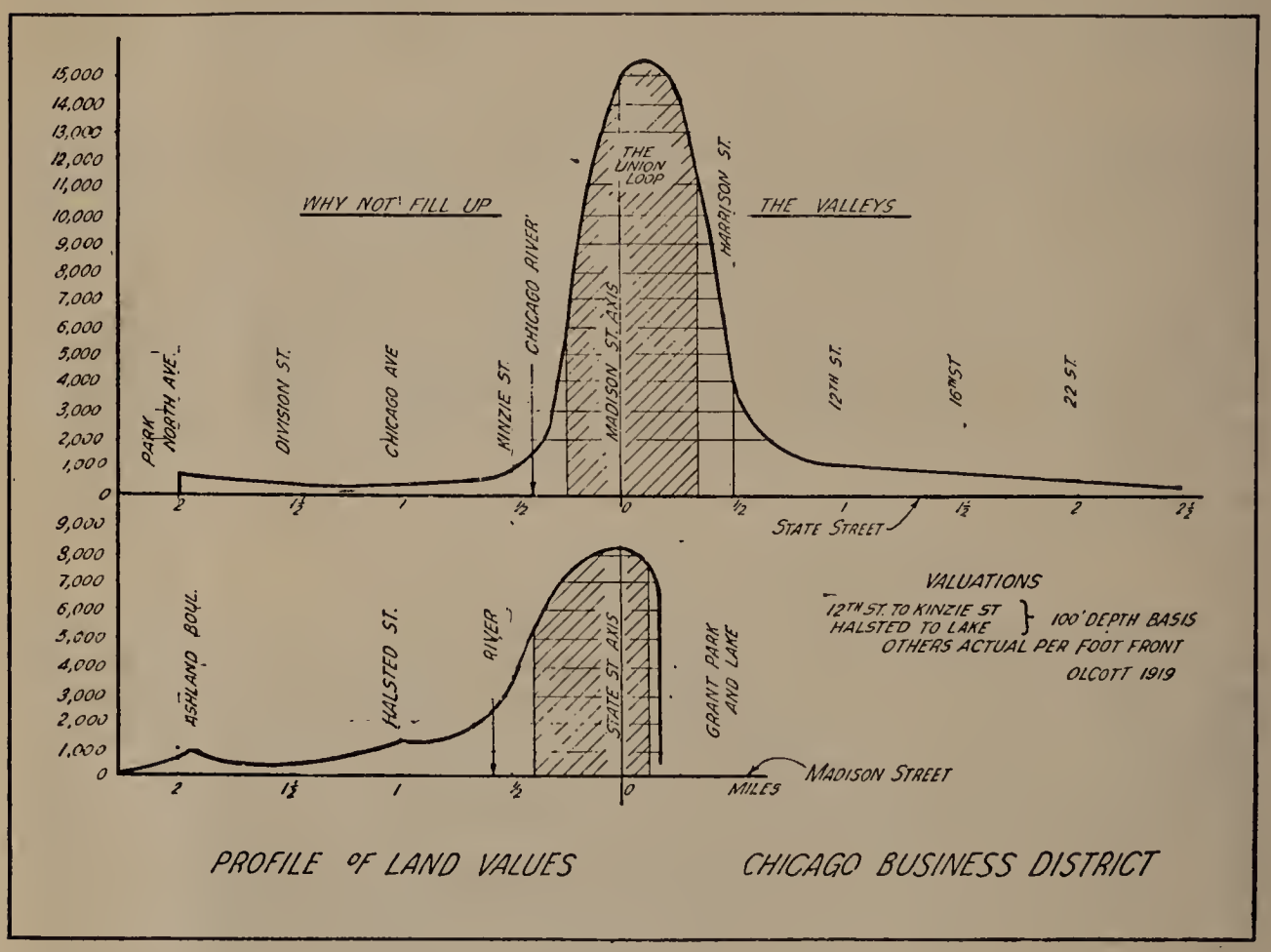
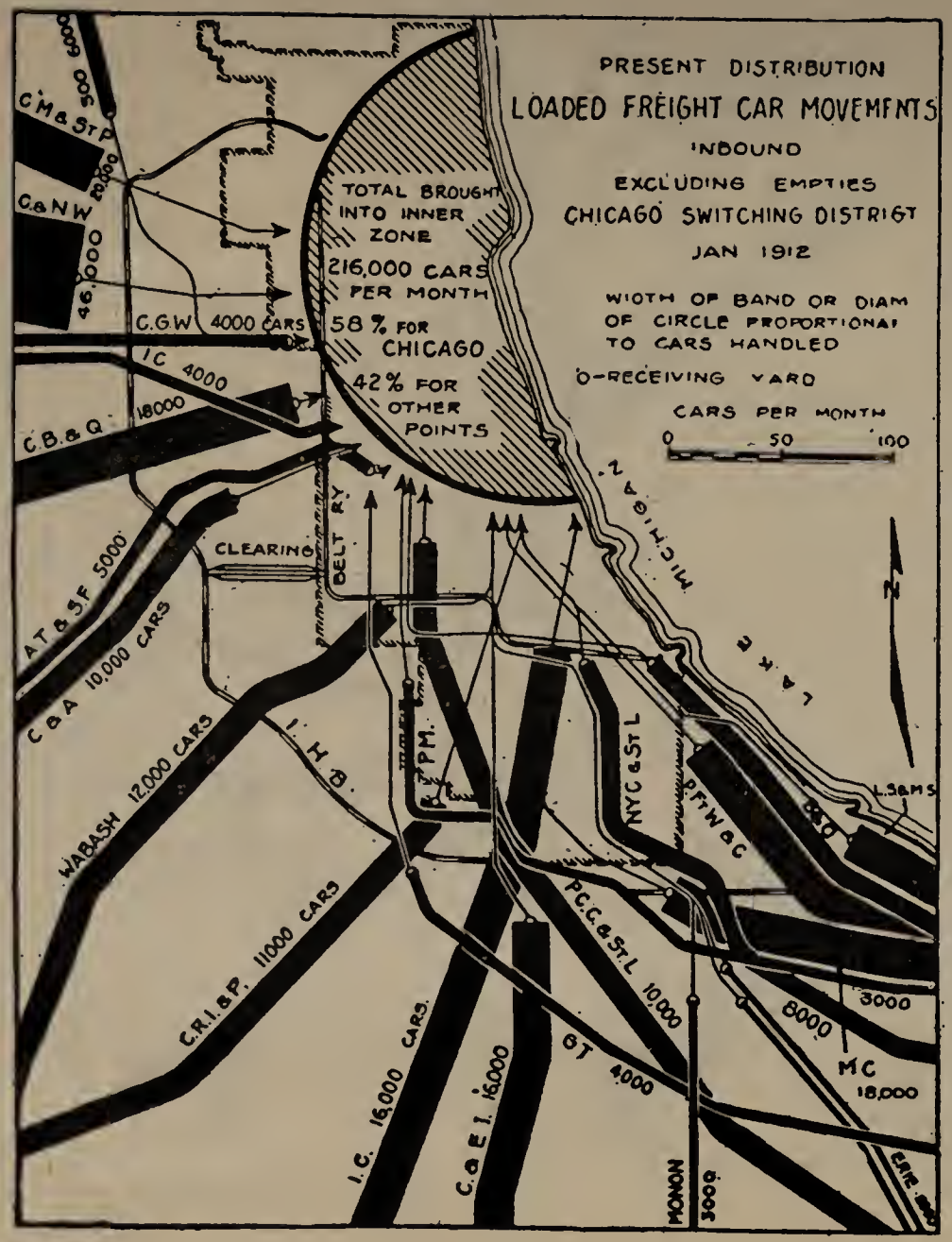


Fig. 25
Land Value Profile (Chicago)

But the cities must reckon with the cost of providing trucking streets and maintaining them. It will not do to over-burden the truck by penalty taxes, for the city may be the loser in the end. This is the same problem, except in local form, that is now before the country as to the use of highways by common carrier vehicles. Penalties may retard the development of an otherwise valuable distribution arm of the railroad system. It should be remembered that local tonnage must all pass over the city streets eventually, whether as at present by miscellaneous fleets of unstandardized, unorganized and partly loaded small vehicles, or by a highly organized fully loaded fleet of demountable body motor cars. Public policy must determine which is preferable. A cost-of-service, pay-as-you-use policy should work even justice to all concerned.



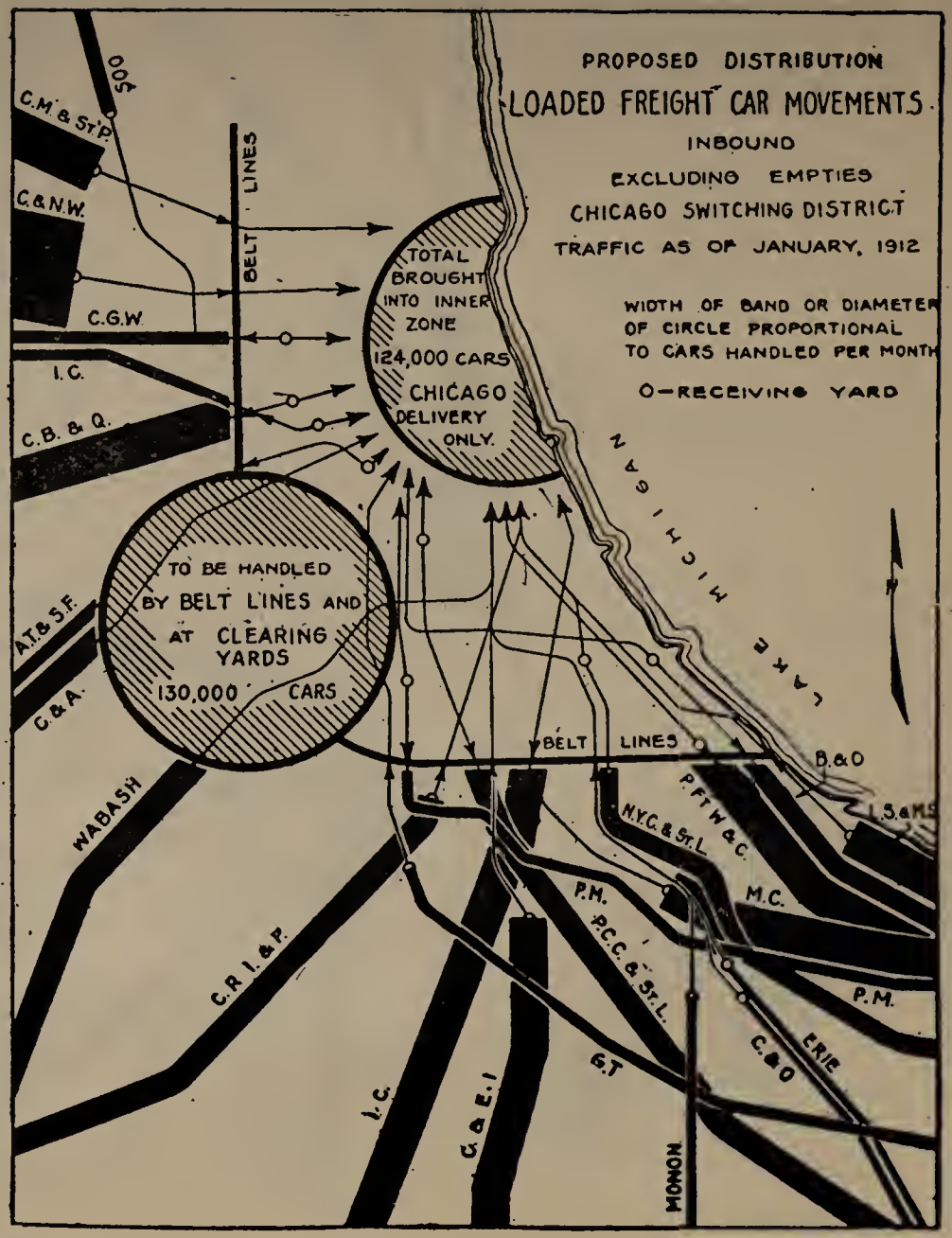


FIG. 26
Freight Clearing (Chicago

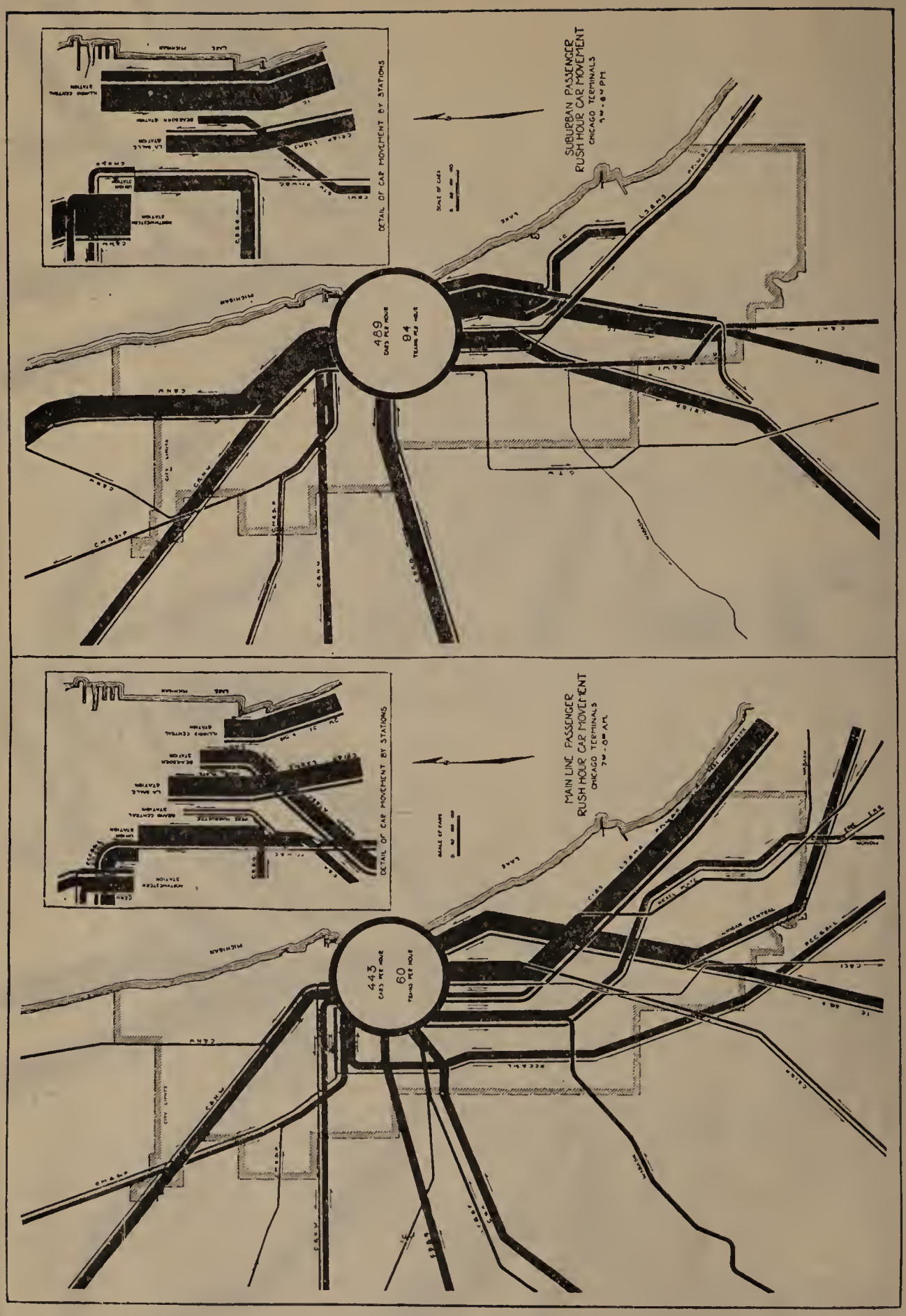


FIG. 27
Railroad Passenger Flow (Chicago)

Motor-Ways and Rapid Transit

It is quite possible in many cities for motor-ways to be built alongside railroad entrance rights-of-way, especially for the handling of railroad freight. This may come with the electrification of the passenger entrances, permitting rail terminals to be receded into more suitable locations where land is cheap. And it is not unthinkable that these same immensely valuable rights-of-way cannot be used either single or double-deck, for rapid transit routes operated as part of the rapid transit system so as to save some of the colossal investment necessary for parallel passenger subways, which many dislike. Chicago has several such routes.

Duplicate Terminals

One conclusion seems warranted, that in the interests of co-ordination, we should not embark further upon the dubious plan of duplicating rail, electric and motor terminals. In Indianapolis there are three super-imposed terminal systems with down town freight houses and routes radiating into all parts of the city and country. There should be some fair method of amalgamating these services into a more efficient transport machine.

Land—Our Future Hope

Finally, it is comforting to find that there are continually expanding resources within the grasp of our cities for financing their share in these great physical improvements. For an analysis of the assessable land values over long periods shows that, in general these values, which represent the city's purchasing power, increase approximately as the 1.7 power of the population; in some cases as high as the square, as in New York. This is an almost mathematical relation, and holds the greatest hope for developments properly planned.

By the same token, it is difficult to see why the principle of local district assessment for financing a small or large part of these public improvements is not a fair bargain. And with the principle of excess condemnation properly applied, local district assessment would avoid most of the wrangling between districts. It is only by a frank understanding of the principles involved in these great public enterprises and the friendly co-operation of all parties concerned, that results will be promptly secured of most lasting benefit.

That will be real CO-ORDINATION.

Gentlemen, I thank you.

OUTSTANDING CONCLUSIONS

1. Transportation is fundamental to national welfare. It is a unit operation, a through movement. Commerce is not interested in the multiplicity of steps, Producer to Consumer.

2. The demand has tended to run ahead of the facilities. This consistent growth must be provided for somehow.

3. It is a peak load business which must adjust itself to commerce like a power load or the "lights go out."

4. Transportation extensions into non-paying territory without reasonable future justification are no longer encouraged. The only alternatives are—cheaper type of carrier or contributions by those benefited, by general or local district assessment.

5. Conservation of the new capital supply is a pressing need requiring some realignments on the basis of maximum service and economy—line, terminal and delivery.

6. In the absence of these realignments, transport difficulties must increase at rush periods, or commerce be arbitrarily curtailed.

7. Gateways or terminals appear to be the large technical problem of the future. The existing independent terminal system becomes more inflexible and costly as it expands.

8. Quicker turn-around, car or ship—more movement, less storage—is the great capital saver.

9. Co-ordination is simply an understanding of facts and a meeting of minds on their significance. The responsibility lies with both carrier and public. Our supplemental carriers have too long been overlooked.

10. Terminal land values constitute a great undeveloped resource. The motor provides the way to turn these assets into real money for development.

11. Use and support of streets and highways has now become an essential part of the transport plan. The public must determine its own best interests—competition or co-ordination.

12. Motorizing transport service thus becomes a possible interim measure to develop most quickly needed capacity at least capital cost.

13. But proof of capacity of streets and highways for greater service is an immediate essential. Congestion is always cumulative.

14. Confusion in transport regulations between small regional communities makes unified action mandatory in the public good.

15. For this reason, city and district planning is today one of the greatest public needs. The traffic problem is imperative.

16. The Metropolitan District system of controlling civic development may furnish the best practicable alternative to "Home Rule."

17. The Transportation and Terminal Plan offers maximum possibilities of quick civic betterment. It is dynamic.

Discussion by: F. A. Delano, Acting Chairman, Plan of New York and Environs—Willard Chevalier, Engineering Editor, *Engineering News Record*—J. C. Lincoln, Traffic Manager, Merchants Assn. of N. Y. —J. S. Marvin, Asst. Gen. Mgr. National Automobile Chamber of Commerce—D. L. Turner, Consulting Engineer, N. Y. Transit Commission—S. B. Moore, Special Engineer, Southern Pacific Lines —Charles Hine—H. D. Emerson—Shirley Eaton—W. E. Symons.